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EDITORIAL NOTES.

Goals of Ambition.

IT is an excellent thing to set for oneself a goal or goals for which to work. In the address with which Mr. J. G. Newbigging opened the new presidential year of the Manchester Institution of Gas Engineers last Saturday, we find several goals for which he is optimistically operating, and with a very proper faith in the possibility of their realization. He makes a sweeping yet minute survey; and by the aid of the versatility and powers of concentration of thought, judgment, and deduction which attach as attributes to his patronymic, he leaves us impressed with the strong belief within him as to the larger sphere that is before, and within reach of, the gas industry for its occupation. This larger sphere forms the main goal of ambition; but the main goal is only to be reached by the attaining of intermediary goals. The achievement is largely a matter resting with technical ability and policy, aided by those conditions which go to constitute that which we call opportunity. We will assume the opportunity—that is to say, good local conditions, and normal purchasing and selling markets for respectively the raw materials and the secondary products of manufacture. These are things that are not altogether within control, though they are things that are not to be left to chance, but must have bestowed upon them the best of business acumen. There are left the technical and political conditions, which are subject more or less to control, and in connection with which there should always be a goal fixed well ahead of present result.

Manchester is one of the gas undertakings that has attained a high degree of efficiency within its works; but the Chief Engineer looks for something better. It is not given to all undertakings to have like opportunities; it is given to all undertakings to work for something more than has hitherto been achieved. We are, however, invited by the address to look for the nonce at things from the Manchester standpoint, and the exercise is one that is not without its value. At the present time a certain stage has been reached in the matter of technical working; and a certain goal is fixed. The question is how best to bridge the space between the existing stage and the stage of ambition; and what encouragement is there given by the developments that have been made in plant and working that the bridging will be successfully accomplished? What is the first goal of Mr. Newbigging's ambition? It is to put gas into the holder free of cost—that is to say, that a balance-sheet of manufacturing costs and residuals revenue up to the point of the passing of the gas into the holder will find the gas without a debit against it. Other engineers have the same ambition; but we are looking at the matter from the standpoint of Manchester. Putting the gas into the holder free of expense, the ultimate price of gas would then depend on the cost of distribution, interest, and sinking fund, or dividend charges, as the case may be, and the other charges which go to make up the cost of the gas to the consumers' meters. The contemplation of this goal clears the vista to the much larger future for the gas industry. What are the prospects technically? The President thinks they are good. With horizontal retorts, and separate charging-machines on each side of the retort-bench, during the year ending March, 1913, gas was put into the holders at a cost of 4·83d. per 1000 cubic feet of gas sold; and with the inclines at the Gaythorn station, at 4·22d. These are notable and stimulating figures, and obtained by systems of carbonization that are now in the category of things technologically regarded as old-fashioned.

These figures at the present time mark the Manchester position; and the President regards what he sees about him as distinctly encouraging—given normal markets for materials and bye-products—to the realization of the goal of a cost-free gas into the holder. The 4·22d. is the space to be bridged. In our carbonizing work there has not been any standing still. Improvements have been many. The dual machined retort-bench, with its duplicate coal and coke handling plant, has given place to the single-machine operated bench, with a resulting lowering of costs all round, and a greater expedition in the performance of the work. In 1914, the inclined system seems to have merely intervened to break the violence of the change from horizontal working to vertical—intermittent or continuous, the latter of which, with time, hardens Mr. Newbigging's belief in its superiority. He admits the heavier capital costs over the horizontal system; but advantages that make for ultimate economy may be a splendid investment for capital. At all events, the figures (for the year ending March, 1913) derived from his trial continuous vertical settings Mr. Newbigging puts forward with challenging boldness; and these he maintains, with confidence, would be further reduced on a large installation by well-supervised working. We will not set the figures out here; they are meant for study, to ascertain the grounds for the belief that the future, always providing markets are kindly disposed, will see gas delivered into the holder free of cost.

Let us, in this connection, quote Mr. Newbigging's own words, as there is something prophetic about them, and they may be useful either to quote against him, or to place to his credit, in the years when the conditions exist under which his anticipation ought to be realized. He said: "I am "sanguine enough to believe that large undertakings adopting continuous working vertical retorts on a considerable "scale, and with normal coal and residual markets, have a "reasonable prospect in some cases of balancing the cost "of coal and manufacturing charges with the returns from "residuals—in other words, putting the gas into the holder "for nothing." When this happens, there will be a large addition to the number of about eight undertakings which deliver gas to the consumers' meters at a cost of under 1s. per 1000 cubic feet sold. In this connection, with oil at recent prices, the prospect of the old prices never again being reached with the enlarged demands for oil, and with the greater productions of gas per ton of coal, the lower average carbonizing costs, and with the potentialities of residuals developed to a larger extent, Mr. Newbigging cannot find it possible to allocate to carburetted water-gas plant a place in the future economy of a gas-works, other than that of a stand-by to take up abnormal demand, and to lend aid when strikes strain the coal storage. Nor in the scheme for the future can he find, with the proper development of the coke markets, that the plant can do much in relieving these markets. The gage that is thrown down here should be picked up by the carburetted water-gas protagonists.

We have pointed out that in this matter of free-cost gas in the holder Mr. Newbigging does not stand alone. There are undertakings, the engineers of which, though with smaller output, are looking to the realization of the same goal. But much depends on the coal and residual markets. Recent experiences show that they are far from always being normal; and the year ending March, 1913, was somewhat abnormal in the wealth of its results in the residuals department—more especially in the tar and sulphate of ammonia markets, while coke had a good sale owing to the big coal strike that took place within the municipal financial year. Therefore the 4·22d. cost for gas in the holder for the old inclined retorts might have been somewhat affected if sulphate of ammonia had been commanding between £12 and £12 10s. (which is likely to be nearer the normal figure than £14 or above), and if coke had not had the coal strike to support its demand. Mr. Newbigging, however, is not convinced that intrinsic value is receiving its measure in tangible coin in connection with the residuals. The residuals are an important element in reaching the gas-manufacturing goal; for they themselves supply at least two goals for which to work. The one is maximum yield; the

other maximum price. In regard to the quantity of coke for sale, the fuel question comes into calculation; and it is a question of the adoption, with proper supervision, of a heating system, the efficiency of which is of the highest order. The value of the tar is improved by the system of carbonization adopted. The accounts of many gas undertakings show that there is a leakage of ammonia here and there that ought not to be allowed to exist. The investigation that Mr. Newbigging has had made at Manchester into the conservation of ammonia indicates the possibilities in this direction; and, as a result of the investigation, the average number of gallons of 10-oz. ammoniacal liquor has been, during the past twelve months, increased by 2·58, compared with the average of the preceding five years. The details are in the address.

These are directions in which the residuals department can supply contributions to the elements necessary to the bridging-over of the space that exists between the present cost of gas in the holder and cost-free gas. When such a position is reached as a cost of 4·22d. per 1000 cubic feet, the difficulty of clearing off this balance becomes more and more pronounced. But there is an additional point. In the opinion of the President, the prices obtained for the residuals are not their actual values. It is plain that he is no believer in the inerrability of the law of supply and demand in the fixing of residuals values. "When," he says, "we consider the importance of the tar, ammoniacal liquor, "and spent oxide, as the bases of commodities of such vital "necessity to the industries of the country, and coke as a "valuable smokeless fuel, we should not rest satisfied until "we receive fair value for them. If we do this, there "should be no difficulty in at least paying the whole of the "coal account from the revenue received from these resi-"duals, as indeed a few undertakings already regularly "succeed in doing." The law of supply and demand requires assistance; and this assistance the work that lies at hand in relation to coke shows has been denied, until recently. Supplementing educational propaganda, coke must be prepared for the market—it must be freed from all deleterious matter, must be in some cases washed, and must be in proper size for every purpose.

The President also suggests, later on in his address, the impregnation of the coke at high pressure with some suitable substance, so as to make it inflammable (its physical characteristics admirably lend themselves to this). Sulphate of ammonia also requires greater attention by some makers —particularly in regard to the moisture and acid content. The unit value of good quality sulphate relatively to other fertilizers is not sufficiently recognized; and efforts are now being made to widen the knowledge. Mr. Newbigging suggests that commercial scope should be broadened by not converting all the ammonia into sulphate; but that part of it should be turned into ammonium chloride and liquid ammonia, and a sale cultivated for the latter product for household use. The President does not say much about tar; in latter years it has been doing better. In regard to spent oxide, Manchester has been fortunate in disposing of it on a separate scale for sulphur and Prussian blue, with the result that purification last year showed a substantial credit balance. This last-named condition is one that cannot be expected in connection with many undertakings; but the others in relation to residuals are all within their range. In this matter of residuals possibilities, Mr. Newbigging is aligned with Dr. Davidson; and months before the last William Young lecture, in private conversation, he had given utterance to the same views.

These are the goals of ambition contributory to the attainment of the one of placing gas in the holder free of cost. But there is no less interest in accompanying the President beyond the holder, where management and distribution costs must, by close supervision, be brought to, and be kept at, the lowest possible point consistent with efficiency. And what is the end of it all? A gas supplied of what Mr. Charles Carpenter would call standard composition, with a low inert gas content so as not to impair flame temperature, and this gas sold at the lowest possible price. With such gas of uniform composition, less obligation is imposed upon the consumer to see that he gets good results from its use; and the gas must be supplemented by consuming appliances that also demand the minimum of attention. Combining these goals (the reaching of which is made possible by the realizations in the manufacturing department), we have the condition where the gas industry will serve communities as it has never served them before, and will contribute still more energetically and continuously to the improvement of our towns and cities.

In this picture, we have set before us as it were a specification of the work to be done. It is ambitious. It is good, however, to find that enthusiasm does not see in it anything that is insuperable. Much else was said by the way, and of more than passing interest, in the address. We must leave these other points, as well as the discussion here of the administrative question as to the relations of municipal gas and electricity departments—a matter which is referred to in "Electricity Supply Memoranda" to-day.

Purification, and Power Operation for Small Works.

THE members of the Midland Association last Thursday again proved the danger of prejudging the character of a meeting by the bare *agenda* submitted prior to the event. The programme on this occasion did not encourage great hopes; but in the result the proceedings were both full and interesting. The new President (Mr. W. J. Rendell Baker) laboured under the disadvantage of a long illness succeeding his recent transfer from Malvern to Mansfield; but he had the whole sympathy of his fellow-members, for he would not permit the drawbacks suffered to deter him from carrying out his presidential duties.

The Inaugural Address was not a long one—a few notes, constituting personal experience and thought, had, under the circumstances, to suffice; but they were notes of a character which turns the train of consideration into the side, but contributory, channels of daily work. Purification formed the main topic; and the change that Mr. Baker made in the gas-purification plant during his tenure of office at Malvern served as the basis of his observations. It was high time that someone took the Malvern purification plant in hand; for, with a make of probably 110 or 120 millions at the time the alteration was effected, purification costs stood at the positively wasteful level of 3d. per 1000 cubic feet of gas sold. The purification costs at this rate must then have amounted to something like £1400 a year. Now the works are making about 130 millions per annum; and in the two years since the change was made the labour cost has been under £20. In this Mr. Baker served Malvern well. It will be of interest when the new Engineer at Malvern (Mr. W. H. Johns) is able to supply the complete costs. This the President could not do, as the purifying material was in use fully two years without the boxes ever being opened, and the same material is again at work. Mr. Baker says that the economy of the new purification plant, with the alterations he made to the old, "more than repays the "annual costs of the money taken up for the installa-"tion." This is putting the position very modestly. The secret of the financial and labour advantages that have followed the supplanting of the old purification system is the ample area of the boxes for the work to be done, supplemented by the rotation system, as well as by having the inlets reversible to outlets and *vice versâ*. It is interesting to notice that Lux material is used entirely as the purifying agent; and this is the material that has been running for upwards of two years, and has again been restored to the boxes for a further spell of work. There have been complaints made elsewhere regarding not altogether pleasant heating-up experiences with the material; while from other places there has come the answer that the material has shown excellent behaviour. Mr. Baker's experience is a certificate to good conduct; and the high sulphur content of 57·25 per cent. before making a change is a figure to which very few engineers can go. The use of coke breeze with the purifying material, in the ratio of 1 of breeze to 2 of Lux, is again a point that, with two years' experience and more in favour, will be noted. It would have been interesting if Mr. Baker could have included in his address the results of some tests of the gas for sulphur during his two years' experience. We notice that he adopted quite a small blower, fitted to the exhauster shaft with a three-speed cone drive, for the regulation of the air in correspondence with the make of gas. The more usual simple expedient appears to be quite sufficient for this purpose, for the variation in the proportion of air to gas made under ordinary conditions is not a matter to which any considerable importance can be attached.

There are one or two other subjects in the address which might be discussed—such as the question of how the Local Government Board Auditors and the Surveyors of Taxes

arrive at different results in regard to profit and loss. There is also the question of the difference in the charge for gas between the ordinary and slot consumers. At Mansfield, the difference has been reduced to 1½d. per 1000 cubic feet. The subject is rather a delicate one for public discussion, as the proper differential charge (though complication resists the application of the individual factor) really depends so much upon each slot-meter user's consumption. But 1½d. is drawing the difference a little too fine, or rather it would be under the circumstance of the conveniences that many undertakings give to their slot consumers. Mr. Baker does not say what is done for them at Mansfield in the way of fittings.

Another item in the proceedings was an informal discussion, opened by Mr. W. H. Adams, of Bilston, on the subject of the equipment of gas-works with coal and coke handling plant. The propriety of this has been settled in the affirmative for the larger gas-works years since. For them it is only a question of the type used, consistent with works conditions. But gradually the line of economical application has been reduced to works of much smaller annual make than the limit once set; and now it is somewhat doubtful how low one can economically go. What has brought some of the smallest works within the limits of power operation has been the development of machinery—combined chargers and dischargers—operating only on one side of the retort-house, thus reducing capital, maintenance, and running charges to a minimum. In the discussion, a works of 70 millions and one of 40 millions output per annum were cited as having adopted power machinery for charging and discharging, with advantage in the matter of costs, and consequently in the cost of gas to the consumers. When charging and discharging machinery is now adopted with the electric-drive (the electricity generating plant being gas-engine driven), it is easy to extend the application of the energy to other work—such as coke handling. For the smaller gas-works, coke-conveyors or telpher plants are out of the question; but in medium-sized works, where there is carburetted water-gas plant, or railway waggons or carts to be loaded from hoppers, and coke has therefore to be raised to a height, the telpher form of plant requires a lot of beating. Mr. Adams, we see, has coke-hoppers beneath his retort-house stage-floor, and he employs manual labour for the removal therefrom of the coke. Coke-hoppers under the stage-floor are excellent things for both preserving the size of the coke and reducing to a low point the percentage of moisture. But, with an electric plant in use, it seems to us that (unless some local condition stands in the way) Mr. Adams might very easily, with advantage to energy costs, adopt coke haulage from the stage-floor hoppers, as practised by Mr. Fletcher W. Stevenson, Mr. Harold E. Copp, and many others. It is an excellent plan when the coke has not to be carried to a height for loading purposes, and even then, under some circumstances, a lift or crane in the smaller works, by which the trolleys can be carried aloft, may be even preferable to the telpher system. Mr. Adams mentioned that with his electric plant he had only had two involuntary stops. The little trouble that occurs with a properly supervised private electric plant is one of its advantages. Not all gas-works that take current from the town cables can boast of immunity from trouble through the sudden cessation of the energy; and as stoppages are usually due to causes that are of a more serious nature than obtain with a small private plant, and over the adjustment of which the gas engineer has no control, his position at such times is not a happy one. The private plant, and in duplicate, is much to be preferred on all accounts.

Several incidental matters cropped up during the discussion—such as the effect of single ascension-pipes—Mr. G. E. Stevenson, among others, finding no difficulty with an excess of sulphur compared with the double ascension—in fact, with a single ascension, his total sulphur is down to 25 grains per 100 cubic feet. The main value of the discussion, however, from our point of view, is the illustration of the fact that power operation has been brought within the scope of works of much smaller output than formerly, with financial benefit to them. For them economies are far more difficult to realize than in the case of larger works; and therefore any movement which contributes to their advantage is a distinct gain to the gas industry generally. As far as geographical and business circumstances will permit, we want to see the great difference in price between the larger and the smaller works brought down to the narrowest possible limits.

The Beginning of the Session's Gas Work.

As will be seen from our "Parliamentary Intelligence," the Select Committees start work to-day; and we launch out on a session that may be fraught with event of considerable importance to the gas industry. Its progress will, therefore, be watched with the greatest care by all responsible for the conduct of gas undertakings. It will have been noticed that various petitions have been lodged against the Gaslight and Coke Company's and the Liverpool Gas Company's Bills, the former of which is only to reduce penalty testing to the calorific power standard, and to bring the clauses referring thereto into model line. It is expected that the calorific value question will be mainly discussed on these two Bills, and that any decision arrived at in regard to them will be used for the guidance of other Committees during the session. The general question has been before the London County Council and the various Borough Authorities. The former are opposing; but in some quarters it is thought that their petition is only a formality, in view of the Council having agreed to practically the same terms in connection with the South Suburban Gas Act, 1912. The Borough Councils are not petitioning, though rumour suggests there may have been a little representation to the Board of Trade in connection with the proposed change. Whatever may be the character of the opposition (if it comes to actual contest), it can only be a question of conditions; as Parliament has already (we may take it from what has transpired in recent sessions) seen the absurdity of the basis of quality not being the quality of primary importance. However, the Bills over which the matter will first come up will be highly important from the point of view of the use that will be made of the decisions during the session; and therefore the gas industry will look to, and may depend upon, the promoters of these Bills doing their utmost to safeguard its interests. The lines of the South Suburban clause are quite good; but it would be totally wrong for the Parliamentary Authorities to insist on the numerical part of the conditions being the same in all cases. Another matter which will be of special general interest will be to see what will be done in connection with the model general purposes clause. We hope to find that there has merely been an error in not reverting to a form of clause such as existed prior to the attack of the chemical manufacturers in 1912; seeing that the new model clause does not give that power of free trading in the secondary products of coal carbonization which the Joint Committee of both Houses of Parliament declared it was wise the gas industry should possess. To override this decision would be to reduce the work of the Joint Committee to a perfect farce, and they might just as well not have sat. It is not anticipated that anything of the kind is contemplated, but that it will be conceded that the form of the revision of the model clause is a mistake, and that Parliament is not prepared to allow the whole matter to be reopened after the careful investigation and fair judgment of the Joint Committee.

German Coal Prices and Gas Make.

THE German gas-coal purchase, whatever may be its amount, continues to excite the attention of the ordinary newspapers. "The Times" has again referred to the subject; and the "Daily Telegraph" has given up a whole column to the discussion of the various possible causes why such a transaction has taken place, though there is no confirmatory information. It is suggested that the movement is a strategic one on the part of the London companies, in order to make the Durham coalowners open their hands, and deal rather more liberally with the home gas industry, or rather the portion of it that is well situated for receiving coal deliveries from Germany. It must be remembered, however, in connection with this suggestion that, before any announcement appeared as to the purchase of German coal, there was talk in the markets of lower prices for the coming contract season, and contracts for the supply of gas coals abroad had already been made at reduced prices. It is also suggested that the purchasing company or companies may be paying the Westphalian Syndicate a little more per ton than the current market price (a little more delivered to the works), in order to make sure of future supplies from Germany. This again cannot be true; for the gas companies are not in a position at the present time—owing to the tightening of the screw by the coal owners, which has had, and is having, such bad effect on the profits of the current contract year—to let any possible gain slip by.

So small has been the import of coal in this country—

contrary to what has been the case in Germany—that it is conceivable that the Westphalian Syndicate are quite prepared to cultivate an export trade for any surplus production by taking a price that is lower than they charge to home concerns. A retaliatory policy on their part is understandable. As a matter of fact, it was known, before this German coal purchase business was engaging the attention of the newspapers at home, that gas undertakings on the Continent outside Germany were obtaining coal from the Westphalian Syndicate at lower prices than the home concerns. One factor in fixing prices by the Syndicate appears to be the competition of British coals. For instance, while in some parts of Germany 13s. or thereabouts is paid under present unexpired contracts for second-class gas coals, in Berlin, where there is keener competition with British coals, the Westphalian varieties can be obtained at about 1s. 6d. or 2s. per ton less. Anyway, the British coal proprietors cannot look with equanimity upon any starting, by the Westphalian Syndicate, of competition with them in this country for some of the larger home contracts. With their success, there would be, in the transport of coal from our shores for use in Germany, and the transport from Germany of coals for use in this country, some beauty about the situation as a study in international economics.

The price that has been named as having been paid for the German coal is 13s. per ton c.i.f. London, which would mean about 10s. net to the Westphalian Syndicate. The question has been raised as to whether the difference between this price and the price that would have to be paid for Durham coal delivered at the works would not be largely diminished by the difference in the yield of the coal. Of course, one cannot speak definitely without tests of the coal under similar conditions. But some actual working results now in our possession, with mixtures of Westphalian coal made up variously from coal from more than a dozen different mines, mostly carbonized in horizontal retorts, show an average gas production in the neighbourhood of 12,250 cubic feet per ton; the calorific power being about 580 B.Th.U. gross. Last half year, the South Metropolitan Company made per ton an average of 12,734 cubic feet of gas; and their average calorific power for the year was about 570 B.Th.U. gross. Therefore, if Durham coal cost 3s. per ton more than the Westphalian delivered, then the latter would be the cheaper, from the gas point of view only, and taking no account of the quantity and quality of the residuals.

Bone and Schnabel.

Britishers are very jealous of the complete retention of all the credit that is due to their own inventors; while they are quite willing to give full praise and value for the inventions of the constructive or originating ability of all other countries. Any honour, too, that is due for invention made on British soil by British brains and skill they are unprepared to share with any other country. The Continent has, in connection with the gas industry, made some wonderful contributions to the means that have contributed to its success; and the gas industry of this country has made abundant acknowledgment, and has sought to add lustre to, rather than (by claiming any share) detract from, the brilliance of the achievements. Now we submit, and very emphatically, that, in the matter of the practical development of the system of surface combustion, this country is entitled to precedence over Germany, through the persistent and persevering work of Dr. W. A. Bone, Mr. M'Court, and other associates, over the past dozen years or so. There has, however, been in Germany for some months past a conjoining, in technical papers, of the names of Bone and Schnabel. Whatever work Herr Schnabel may have done in connection with surface combustion, there is no reason whatever why he should be allowed to share in any glory that there may be in the British work in the same direction, by hyphening him up with Dr. Bone, as some writers on the subject in Germany have been doing. Dr. Hans Bunte, at the last meeting of the German Gas Association, spoke of the Bone-Schnabel system. In an article published in "Stahl und "Eisen," in November last, by Herr von G. Neumann, the "Bone-Schnabel" boiler was mentioned in the heading, and the "inventors" were referred to throughout the article. There is not the slightest justification for linking the names together in this way.

Thus it came about that, in a lecture on surface combustion (reported in other columns) at the Royal Institution on Friday last, Dr. Bone interrupted its course, to make a public and dignified protest against this uniting in Germany of his name with that of Herr Schnabel, and by such simple expedient filching from those who worked so assiduously at Leeds part at any rate of the credit for the practical outcome of their labours. Above all, the boiler which has a thermal efficiency surpassing any other system of steam-raising is purely the right of Dr. Bone and his fellow-workers, and no one in Germany has any legitimate claim to a share in it. The proper name for the boiler is the "Bonecourt," and no other can be properly placed upon it. One of these boilers has been installed at the Krupp works in the Ruhr district of Westphalia, and the official tests are expected to be published shortly. Therefore Dr. Bone's protest was a timely one. Some of his words seem to be permeated with warning. "It may be necessary for "me," he said, "to deal more fully with this aspect of the "matter" [apparently the claim suggested by the linking-up of the names], "but to-night I will content myself with a "protest against any attempt to claim or to represent the "boiler as, in any part, a German invention." We hope that our German technical contemporaries will note the protest, which was cordially endorsed by renowned men of science within the walls of the Royal Institution on Friday evening.

Mantle Prices to be Increased to the Trade.

From an announcement appearing in another column, it will be seen that recent conferences of the British mantle makers and the German firms interested in the English trade have resulted in an agreement being arrived at to raise the price of their goods. The rise, however, we are assured, is not to be of a very serious character. In fact, the better-grade mantles are only to have added to their price the amount that is represented by the increase which has taken place in the value of thorium. It is the poorer grades, which it is stated have been sold at a loss, that will be mainly affected. Time alone will show whether the opinion is well grounded that the increase to be made in the price of the better-grade goods is so trifling that the retailer will be unable to put up the cost to the public. It is to be hoped it may be so. But while the supply of cheap and good mantles is of the greatest importance to the gas industry, the prevalence of those whose main attraction is their cheapness is unlikely to give satisfaction to anyone. In so far, therefore, as the alteration in prices secures its anticipated result of creating an increased tendency on the part of people to purchase the better-grade mantles—by more nearly equalizing the cost of the different grades—gas undertakings will have little fault to find with the step which has been taken.

Gas Company Registrations.

Inevitably, when "Meteor" of the "Electrical Times" touches gas matters, he trips up. He has been rubbing his hands gleefully over the fact that the capital of new gas companies registered during each of the last three years has shown a decline, while electrical concerns exhibit a considerable increase. The drop in gas figures (which were supplied by the Editor of the "Investor's Guardian"), "Meteor" thinks, shows the "enthusiasm" of the investing public in gas-works. A well-cultured sarcasm is among the qualifications of our friend. It would be known to him if he were not so meteoric in his movements, and just stopped to think a little deeper, that there can be no comparison *en bloc* between the registrations of "electric" companies and of gas companies, for the simple reason that the electric concerns include traction enterprise that does not come within the scope of gas undertakings. In the second place, the United Kingdom has its coast-line limits; and the land is already pretty well covered by gas undertakings. Therefore the extensions and developments now taking place are not by the registration of new companies but by extension of the present concerns. Furthermore the nominal capital of newly-registered companies does not necessarily represent prospective issued capital. Whether the public regard gas as a good investment is seen in two ways. First by the Board of Trade returns. Excluding all municipal and non-statutory gas undertakings, and dealing only with the statutory gas companies, the share and loan capital issued and fully paid up in 1882 was £32,934,935, and at the end of 1911, £92,989,600. Does this look as though the enthusiasm of investors in gas undertakings was on the wane? When the

next returns reach us shortly, we undertake to say that there will be a further good addition to investments. During the depreciation of first-class securities in recent years, speaking generally the prices of gas shares only receded a point or two per cent.; and since the last change in the Bank rate, these points have been mostly recovered—in some cases more so.

Suddine Limited.

The making of a commercial success of Suddine Limited—which Company are proposing to put a new fuel on the market—seems to be a long-winded affair; but fabulous fortunes are now within sight, according to the impression intended to be left on our minds after reading a report of a meeting of the shareholders held on the last day of December, 1913. The fuel manufacturing experiments were being made in 1911; and early in 1912, we had copies of a prospectus before us. There seems to have been experimenting going on at intervals ever since; and yet there ought not to have been so much time required in launching out such a simple process. Moreover, "time is money" where gold exists, and has merely to be picked up. The Company, it will be remembered, are proposing to make briquettes; and the millions of pounds' worth of waste that goes into the dustbins of the country, the chalk deposits of the country, and the sudd of the Nile—all of which are available to anybody on the same terms as to Suddine Limited—are of the components of the new fuel. The reports indicate that some 78 per cent. of chalk is in the composition of the fuel. Those running Suddine Limited think the time has now come when they can float a larger company to exploit this valuable business; and so, in the first place, they are, through a privately circulated letter, suggesting that the public should subscribe for 6500 10 per cent. (!) participating preference shares of £1 each and 10,000 founders' shares of 1s. each. After the fixed preference dividend of 10 per cent. has been paid, the remainder of the magnificent divisible profits are to be divided between the preference shareholders and the holders of the founders' shares. The Directors are proposing to issue the shares direct, as they are not believers in paying big commissions to outside promoters. That is admirable.

Reminders of Past Days.

The meeting referred to above was presided over by Sir C. B. H. Soames, Bart., the hero of various promotions criticism of which has been made in our columns, and whose signature has been appended to certain appeals for subscriptions for shares in various concerns. We see too that the Vice-Chairman of the Company is Col. the Hon. H. V. Duncombe, who was a Director of the Brighton, Eastbourne, and Bognor Crystal Water Company, with the words "Brighton" and "Water Company" printed in big black capitals, and the rest of the title in comparatively insignificant type. We also notice the Macleans were there—both the Captain and the Doctor, who assisted Eaton in many a promoting campaign. H. Hollis, "C.E.," is the Secretary; a H. Hollis, who was a Surveyor and Estate Agent at one time, was a Director of the Weald District Gaslight and Coke Company. The presence of H. W. Way, J.P., is noted, and a H. W. L. Way was a Director of the ill-fated Laindon Company, and we seem to remember (we will not trouble our files) the name in association with other companies. We see other "C.E.'s" were present at the meeting—J. Greenfield and J. W. Butler. Mr. Greenfield is also a "M.E.C.I.I." We give that up. Mr. D. Wallace Heims, "C.E.M.E.," of the Technical Institute, London, is among the reporters on the new fuel; and he has reported in the past on natural gas and oil. We have never been to the "Technical Institute, London."

Prospectus Statements.

When recently criticizing in the "JOURNAL" columns the statements made in the prospectus of the East Pembrokeshire Gas Company, including the estimate of Mr. George A. Smith, "C.E., Consulting Gas Engineer," that something like 2s. 6d. per 1000 cubic feet profit was the "bird in the bush," it was suggested that one of the Directors—Mr. J. M. Rainsford—should send us a list of the gas company amalgamations with which he has been identified, in order to justify the statement on the prospectus that he had been "associated, for upwards of forty years, with the largest London and Suburban Gas Amalgamations." Mr. Rainsford has not seen fit to comply with our request; and, as further copies of the prospectus have come to hand, some of which have been addressed to lady holders of shares in substantial gas companies, we have been making some investigations into the matter. It is not desired to be in any way harsh so far as Mr. Rainsford is concerned; but we are duty-bound to do a part in suppressing the circulation of statements put forward to induce the public financing of gas concerns that are not strictly in accordance with fact. We should regard as among large London and Suburban amalgamations, those effected, within the past forty years, by the South Metropolitan Gas Company, the Wandsworth, the South Suburban, and the Tottenham Companies, and as smaller ones those of the Croydon Gas Company. All we need say, as the result of our inquiry, is that Mr. Rainsford was not connected with any of these amalgamations; so that it was not correct to say: "Associated for upwards of forty years with the largest London and Suburban Gas Amalgamations." In a circular letter, addressed to the subscribers of the "late" Somerset and Gloucester Gaslight and Coke Company, the association referred to was made quite a strong point.

PERSONAL.

Mr. JAMES D. LUCK, the Assistant Manager of the Hawick Gas-Works, has been appointed Manager of the Markinch (Fife) Gas Company.

The appointment is announced of Herr FRITZ ESCHER, present Works Engineer of the Strassburg Gas-Works, as Manager of the Zurich Municipal Gas-Works, in succession to the late Herr Albert Weiss.

The successful candidate for the position of Manager of the Swinton and Mexborough Gas Board (recently advertised in the "JOURNAL") is Mr. J. W. BREARLEY, now Assistant-Manager at the Longwood Gas-Works.

Mr. FRANK H. ROBINSON, Assoc.M.Inst.C.E., Resident Manager of the Knutsford Gas and Water Works, has been appointed Engineer and Assistant-Manager of the Harrogate Gas Company. Applications for the position were invited in the "JOURNAL" for Jan. 6; and there were a large number of responses.

Mr. W. H. A. CHESTER, Assoc.M.Inst.C.E., has recently resigned the position of Manager to the Middleton Corporation Gas Department in order to take up that of Deputy-Engineer to the Brisbane (Queensland) Gas Company, under Mr. C. F. Broadhead, who was appointed their Engineer about two years ago. Mr. Chester is the eldest son of the late Mr. W. R. Chester, M.Inst.C.E., who was for a long period Engineer and General Manager of the Nottingham Gas Department. He was educated at the Nottingham High School, at Denstone College (North Staffordshire), and at the Nottingham University; was articled to Mr. J. H. Brown, late Engineer and Manager at Nottingham, to whom he afterwards acted as assistant; and holds numerous certificates in technical subjects, including first-class honours in "Gas Engineering" and "Gas Supply" of the City and Guilds of London Institute. Mr. Chester sails for Brisbane the first week in May.

At a dinner held in the Grand Hotel, Wicklow, last Tuesday evening, to wish Mr. J. F. TYNDALL (the Resident Gas Manager) farewell, and to welcome Mr. W. EWING, his successor, there was much evidence of the popularity which the former gentleman has deservedly won during his lengthy residence in the town. The company present included the Directors of the Company, gas managers from different parts of Ireland, and many influential local gentlemen. Mr. E. M. Collins (the Chairman of the Urban District Council) congratulated Mr. Tyndall on his promotion to Whitchurch (Salop), and said that during his stay in Wicklow he had earned the esteem of all classes by his courteous manner and strict attention to business. Mr. F. M'Phail, J.P., also bore testimony to the good work Mr. Tyndall had done in the town. The Chairman (Mr. T. P. Newbold, a Local Director of the Gas Company), who expressed regret at Mr. Anderson's absence through indisposition, then presented Mr. Tyndall, on behalf of the Company, with a gold watch, as a token of their appreciation of the valuable services rendered by him during his six years' management. New and up-to-date plant had been erected under his supervision; and improvements had been made in the distributing system. By his skilful management, also, the price of gas had been reduced by 9d. per 1000 cubic feet. Mr. Tyndall, in response, said he would certainly carry away the most pleasant memories of Wicklow. He complimented the employees on the loyal assistance they had rendered to him. Mr. J. E. Mooney, on behalf of the employees, made a presentation to Mr. Tyndall consisting of a silver cigarette case, as a token of the good wishes of the men, and an acknowledgment of the kind and considerate way in which he had always treated them. This Mr. Tyndall acknowledged in feeling terms; and then the health of the new Manager was drunk, at the call of Mr. J. Paterson, the Manager of the Waterford Gas-Works, who remarked that they were fortunate at Wicklow in having such a successor to Mr. Tyndall. In response, Mr. Ewing assured them that he would do his best for the Company and the consumers.

OBITUARY.

Mr. WALTER YOUNG, the Manager of the Epsom District Council Water-Works, died last Friday week, following an operation. Mr. Young was appointed in 1900, and has proved a very able and conscientious officer. Deceased was 53 years of age, and leaves a wife, two sons, and a daughter.

Mr. WALTER MONK, Assistant Manager to the Herne Bay Gas Company, died last Thursday, after a short illness. He received his training at the Truro Gas-Works, and upon the completion of his articles 3½ years ago went to Herne Bay, where he soon won the esteem of the Manager (Mr. C. V. Bennett). The son of the organist of Truro Cathedral, deceased himself possessed considerable musical abilities.

We much regret to receive the announcement of the death of M. PAUL SOLANGES, which occurred on the 7th ult. at Multedo, Pegli, near Genoa. He had been for many years the Manager of the Milan Gas-Works belonging to the Union des Gaz, though he had retired from the position some considerable time ago. He was of French nationality, and possessed all the admirable qualities of taste and distinction associated with a French gentleman. He was a man of genial bearing, courteous to his subordinates, cultured, and of literary attainments. His qualities endeared him to both the English and Italians with whom his position brought him into contact.

DERWENT VALLEY WATER-WORKS.

An Explanation—and an Apology.

IN the "JOURNAL" for the 16th of September last there was given a summary of a report presented to the Nottingham Town Council embodying the results of investigations into the condition of the works, made by Mr. James Watson, M.Inst.C.E., the Water Engineer to the Bradford Corporation, and Mr. Edward Sandeman, M.Inst.C.E., the Consulting Engineer to the Derwent Valley Water Board. The main dam is practically completed; but after carrying wing trenches into the hillsides for 500 feet at each end of the dam, it was considered advisable to extend the east-wing trench for a further 300 feet, so as to guard against leakage round the end of the dam. In the subheading to the article in question appeared the words "Defects in the Works;" and we regret to find that in some quarters a wrong interpretation has been placed on our use of these words, as implying defects in design. This, it need scarcely be said, was far from being intended. Indeed, it was acknowledged that elaborate precautions had been taken to secure the water-tight character of the work. It was the subsequent discovery of the condition of the strata that caused what was regarded as a defect, and no error or oversight on the part of the designer of the works. We desire this to be made abundantly clear. We regret exceedingly that the word "strata" was not employed instead of "works," which, however, was used in its broadest and not in its restricted sense. We owe to the able Engineer who designed and carried out the works this explanation and apology for any reflection which may appear to have been cast upon him.

The Tax on Benzol.

Referring to this matter last week, "The Motor" said: "The Budget statement is due in April, and rumours are current to the effect that it will include an announcement by the Chancellor of the Exchequer that the tax on benzol will be levied forthwith. Ever since Mr. Bigland, M.P., asked the Chancellor in the House whether the Government would undertake to allow the sale of home-manufactured petrol or petrol substitutes free of Excise duties, with a view to securing an adequate supply immune from the liability of capture by an enemy, and received the reply 'The answer is in the negative,' insistence on the tax has been, expected. Motorists are the only road users selected for taxation for road upkeep. The tax is derived from fuel. It seems inevitable that whatever fuel is used it will be taxed; the fact that it is home produced, that its use in this country should be encouraged by every possible means, and that in keeping it for use instead of sending it abroad we are safeguarding ourselves in case of national emergency, counts as nothing whatever with the Government. It is difficult to see how the cost of the necessary machinery for collecting such a tax will warrant the net receipts. It must be remembered that the number of benzol manufacturers is very considerable, and that many of them are only small producers. If the Government are anxious seriously to check the growth of the home-produced fuel movement, the rumoured intention will effectually achieve the object. We have yet to hear whether it is intended to levy the full impost, or whether a preferential tax will be imposed."

INSTITUTION OF GAS ENGINEERS.

Preliminary Announcement as to the Liverpool Meeting.

BY direction of the Council of the Institution of Gas Engineers, the Secretary (Mr. Walter T. Dunn) has issued a circular in regard to the forthcoming annual general meeting, which, as readers are aware, will be held in Liverpool, under the presidency of Mr. Edward Allen, M.Inst.C.E., the Engineer of the Liverpool Gas Company.

The meetings will take place in St. George's Hall, and will commence on Tuesday, the 16th of June, with an official welcome by the Lord Mayor, the Right Hon. Herbert R. Rathbone, J.P., and by the Chairman of the Gas Company, Mr. H. Wade Deacon, J.P. In the evening of the first day a reception will be given at the Adelphi Hotel by the Chairman and Directors of the Gas Company; and on the following evening the Lord Mayor and Lady Mayoress will give another at the Town Hall. Friday will be devoted to an excursion to Chester and a visit to Eaton Hall. Invitations to all of these functions will be extended to ladies. The programme of papers and reports for presentation at the meeting is now being drawn up, and members intending to offer communications are requested to inform the Secretary at an early date. With reference to travelling facilities, it is expected that, as in former years, the railway companies throughout the United Kingdom will grant to those attending the meeting the privilege of tickets at the rate of a fare and a third for the double journey, on presentation of the Institution voucher when booking.

The final paragraph in the circular is devoted to the Benevolent Fund of the Institution. On behalf of the Committee of Management, the Secretary expresses the hope that the recipient of the circular will allow his name to be added to the list of contributors, if it is not already there. He calls attention to the object of the fund, and states that there are at present thirteen persons receiving assistance. Owing to the deaths of some of the regular subscribers, the receipts are not sufficient to provide for the grants now being allowed. New subscriptions are therefore earnestly solicited; and we trust that the appeal may not be made in vain in the present instance.

ELECTRICITY SUPPLY MEMORANDA.

ELECTRICIANS will be disposed to be very critical over the discussion of the policy of conducting municipal gas and electricity departments, by Mr. J. G. Newbigging, in his Presidential Address before the Manchester District Institution of Gas Engineers. The Chief Engineer of the Manchester Corporation Gas Department has great ideals; but, unlike many ideals, they are practical ones. In this particular case, however, he will find the ideal presented will prove a controversial one. No one will deny the stupid waste and the conflict of interests that now take place and exist in connection with the municipal conduct of gas and electricity departments; nor will anyone other than electricians deny the absurd character of some of the electrical competition. In certain instances, it is competition run mad; and no one would think, being unaware of the circumstance, that there was a common municipal ownership. Mr. Newbigging thinks it is high time that the two services were run in a sane manner, and with evidence of the common ownership and purpose obvious in the work of management. He may, however, take it that, instead of his suggestion being hailed generally by electricians as statesmanlike, it will be, according to long-established habit, quickly described in certain of the electrical journals as an abject sign of weakness, even though the increase in the number of Manchester gas consumers has been, in the past five years, nearly equal to the total number of electricity consumers. The plan that is offered for consideration is merely this—that, where both the gas and electricity undertakings are under one municipal government, they shall be conducted each with its own independent technical staff, but that the commercial, secretarial, and accountancy sections shall be undertaken by one common staff. The technical staffs will provide the commodities; the commercial staff will sell them where they can, and make of them the best possible trading success, by rendering the best possible service, without cut-throat competition.

The Municipal Utopia.

Possible Grounds of Opposition.

The short answer to the proposal we predict will be that denuding the business in the two commodities of active competition will not be in the largest interests of the communities. But the economy of the single commercial department, with the two technical staffs devoting their energies to the production of the commodities at the lowest cost, would undoubtedly be to the interest of the pubic—providing both commodities were in the trading treated impartially. The competition of municipal departments at the present time cannot claim to be of a very rational order; and the sooner something displaces it that is rational, the better for both concerns and the public interest. Another argument may possibly be that the technical

staffs—especially the members of the electrical one, who have been trained up to regard a marvellous disparity in charges as the acme of commercial method—would be afraid that the excellence of their technical work would be neutralized by the system of the staff in charge of the sale of gas and electricity, and their own opportunities would be thereby curtailed. No one has tried Mr. Newbigging's proposal for a common and independent sales department. Until it has been tried, we should not like to pin ourselves down to the belief that, in all cases and under all circumstances, the plan would result in a greater commercial efficiency, and in a fair treatment of both commodities. The personal factor and individual predilection show up as much in commercial work as in some other branches of activity. But anyway Mr. Newbigging's idea would be preferable where independent action prevailed than the system now obtaining in certain instances. But to get this independence, a clean sweep would have to be made of the men—men saturated with the superiority of the commodity they at present sell—in the two existing separate departments; and a new order of men would have to be trained and brought in who would deal with the two commodities just as the man behind the grocer's counter does with tea and coffee. He gives the customer just whichever commodity is preferred or wanted, nor does he check him if he desires some of both. Perhaps Mr. Newbigging had better consult the men in the commercial departments of the two Manchester undertakings so as to ascertain the nature of their views on his proposal. Meantime, Mr. Newbigging and Mr. S. L. Pearce continue to lay their heads together to ascertain how matters are proceeding in connection with the provision of city gas for use with large internal combustion engines for producing electricity at the generating stations. There is a fair amount of confidence that this will in time come about. How, may be seen by Mr. Newbigging's address, and, in less extended form, by the editorial, "Goals of Ambition," in earlier columns.

The Low-Down Game.

Intrusion upon any man's private affairs for making journalistic or trading point, we have always regarded as being contemptible, and an action that no one would have recourse to who is entitled to the description of gentleman. Had we wished, for the benefit of local gas undertakings, to make in the "Memoranda" capital out of the knowledge of the private affairs of men connected with the electrical industry, there have been many and great opportunities. We can hardly think that the responsible proprietors of the "Electrician" would have allowed the following paragraph to have appeared in its "Commercial Supplement" had the matter been brought to their direct notice:

> With a view to making all the facts known, we invite those of our readers who know of cases of officials or directors of gas companies who use electric light, wholly or in part, in their private residences to write to us. We invite our readers to send us the names of such officials or directors who are guilty of this misdemeanour.

If any such mean action was taken, the natural reply would be to prepare a list of all the known electrical men—we ourselves could name a number without reference to gas undertakings—who use gas for some purpose or other in their residences, as well as a list of prominent men in the electrical industry who are considerable investors in gas undertakings. We know that, in comparative lists of the kind, electrical men using gas would far exceed gas men using electricity for any purpose; but we will play the game, and leave work of the kind suggested to those better qualified to perform it.

Public Lighting.

More instances have come to notice recently where good public lighting contracts have been secured by gas companies in open competition with electricity—the electricity supply being in the hands of companies and not of municipal authorities. This success of gas is not surprising when one sees what is obtained in the nature of street lighting from what are called (say) 50-candle power metallic filament lamps. A very little way from the post darkness reigns; and the result has been that municipal authorities have found it necessary to put in units of increased power, while contracting electricity companies have not been able to do this without producing a loss on their contracts; or, if they have made a change without increasing the price, it has been solely for the purpose of doing something to protect such good reputation as they have earned. It is becoming more and more recognized by public lighting authorities that, in order to obtain an equal illumination efficiency in the streets, metallic filament lamps must have a higher initial candle power than inverted gas-lamps. They are also recognizing that reliability is a factor to be taken into consideration in connection with street lighting and public safety. The Tottenham Light, Heat, and Power Company have won a ten years' contract, as against electricity, through the economy they were able to show by means of inverted gas-burners and automatic lighting and extinguishing appliances. At Reading, also in competition with the Electric Supply Company, the Gas Company have secured a ten years' contract—the Council having come to the conclusion that the Gas Company offered better value for less money. The Council have seen the district of Caversham lighted by electricity; and they have seen modern lighting by gas-burners.

Smaller Candle-Power Half-Watt Lamps.

There are alternative views on the subject of whether the half-watt lamp will ever get down to the domestic units at the ordinary voltages. Investigations suggest that there are physical difficulties in the way of this consummation, for which difficulties the majority of central station managers are supremely thankful. But others take an opposite view, and hope for the advent of the lower power lamps, with manifestly little realization of what it is they are hoping for, unless it is a decided wish to become acquainted with a winding-up order. However, the 600-candle power lamp (300 watt) was the smallest unit made until recently; but there is one manufacturing concern—the A.E.G. Electric Company, Limited—who claim to have made 200 and 400 candle power sizes. But the first-named unit is only for voltages of 50 to 65, and the second-named unit for that voltage or for 100 to 130.

The Claim and the Test.

Will the makers of half-watt lamps guarantee the nominal candle power of the lamps as actual, that it will not diminish more than (say) 10 per cent. in 800 hours, and that the efficiency is initially, and will remain during life, 1 candle power or thereabouts, per half watt? The reason we ask for this information is that a lamp under photometrical test has not so far given more than 75 per cent. of the nominal value attributed to it, and the wattage has been 0·7 to 0·8 per candle. What is going to happen to the lamp later on is not known.

Cottage Lighting.

The views of our electrical friends as to the eligibility of cottage property as a means of securing additional lucrative business receive expression in a spasmodic way, and, as a rule, the initial confidence is of an ephemeral order. Occasionally we see a repetition of the attempt to secure business from the cottager, and on lines that induce a suspicion in the mind that all is not right somewhere. There is Barnes at the present time proposing to fit up certain cottages, put in 30-watt lamps (the first ones free, the tenant paying for renewals), and give the tenant perfect liberty to use the lamps as long as he thinks desirable per week at the inclusive charge of 2d. each. We should like to know on what lines the 2d. has been calculated, and whether the scheme is really put forward as a sound commercial proposition. If 8d. per unit is the foundation for the charge of 2d., and is intended to include an unlimited supply of current for lighting by means of the lamp, depreciation and interest on the wiring and fittings, and the cost of the first lamp, the 2d. would only allow the use of 250 watts per week, and this would mean an average of eight hours' use of the lamp during seven days. From the cottager's point of view, only eight hours' use would not be of much value. If 6d. per unit is the basis of the charge, the 2d. per lamp would allow of only eleven hours' use per week. Cottagers are not likely to be content with an average use per lamp of only eight or eleven hours; and we see that under the scheme they can have as few as two lamps at the price of 2d. each per week. Supposing the possessor of two lamps employs them in the winter for six hours a day in seven days, for the two lamps this would mean 2½ units, and the revenue for the electricity undertaking, including current, wiring, and fittings, 4d.! The proposition looks a bit unhealthy for the electric lighting department of Barnes.

Town Gas and Electricity Generation.

"Electrical Industries" has a little peg at our recent comments on the subject of the use of electricity in gas-works. Of course, central station engineers do not like the fact getting abroad that large consumers of electricity can obtain, with a gas-driven generating set, electric energy at a cheaper rate for any purpose than it can be profitably supplied at from the town electricity cables. The comments on our article are too puerile to call for reply. They appear on page 177 of the issue for Jan. 18; and on p. 179, is an advertisement headed, "In Praise of Westinghouse Horizontal Gas-Engines." Below is a testimonial from the Empire Electric Theatre, South Bank, Yorkshire. It is addressed to the Westinghouse Company, and reads:

> The two sets comprising Westinghouse horizontal gas-engines (each 26 B.H.P.) and dynamos which are used for generating electric current for the entire theatre lighting and cinematograph lantern are working to my complete satisfaction. They have proved reliable in every respect. Each set develops 200 amps., 75 volts, and the complete electrical equipment including switchboards, lamps, &c., all of Westinghouse manufacture, have proved in every way satisfactory. No special attention is required after starting up, the driving is perfectly steady, and the engines are very economical in gas consumption. The cost of town gas, at 3s. per 1000 cubic feet, amounts to less than 1s. 6d. per hour for each engine.

This is a good testimonial, seeing that in many places town gas for power purposes ranges from 1s. 6d. to 2s., while in not a few it is obtainable at prices below the 1s. 6d.

"Meteor" and Misrepresentation.

It is anything but creditable for "Meteor" of the "Electrical Times" to take the licence that he does in dealing with gas affairs. The misrepresentation is not of a character that can find favour with electrical engineers who

take the trouble to investigate both sides of a question. In the issue of our contemporary for Jan. 18, "Meteor" writes on the subject of the hygienic testing of gas-fires, and he makes certain remarks very similar to statements for which he has before been responsible, and which we have pointed out—giving chapter and verse—are contradicted by the research of scientific men of position and integrity. He says: "The designers of gas-stoves have to reconcile two imcompatibles, efficiency and innocuousnous [*sic*]. The more complete their precautions for keeping harmful products out of the room, the more they have to waste heat units up the flue. They may be able to contrive small savings here and there, but that is the broad effect." It is nothing of the kind. It has been proved over and over again by the most careful investigations that absolute hygienic efficiency is obtained by modern gas-fires with the complete maintenance of the high heating efficiency—in fact, the modern gas-fires constructed to carry off all the products of combustion through the flue-vent and discharge them into the chimney without the aid of flue-pipes have a higher heat efficiency than the fires of (say) three or four years ago. We wish "Meteor" would be a little more courageous, and say that Professsr Bone, Mr. Butterfield, the University of Leeds research men, and several others are a pack of incompetents and the authors of a considerable mass of published falsehood. To all intents and purposes that is what his broad suggestions, which are contradictory of the results of the work of these scientists, amount to. If he would be pronounced in the manner we suggest, there would be an opportunity of making "Meteor" see the folly of his misrepresentation. Another of his paragraphs in the same issue is headed "Electricity Couldn't have Done It." It is a reference to the Kingston explosion, caused through the inhabitants of a house wrongly using an old-fashioned chandelier. "Couldn't have Done It?" "Meteor" has already forgotten the Hebburn explosion (through electrically generated bitumen gas) in which two lives were lost, and various houses wrecked. He has also overlooked the Nottingham explosion, and the cost in which the Electricity Committee were involved. There have been many other happenings for which electricity has been responsible. The two mentioned will do as examples.

PRICE OF INCANDESCENT MANTLES.

Some Advance by Makers Agreed to.

A FEW weeks ago, reports appeared in the Press—as noticed in the "JOURNAL" at the time—foreshadowing an advance in the price of incandescent mantles. It was then pointed out that the price of thorium was raised on Jan. 1 to a figure approximately 30 per cent. above that recently ruling, and that in addition the manufacturers' general expenses have been steadily increasing. A meeting of British and Continental manufacturers had at that time been held in Berlin, to consider the commercial position of the industry; and another similar meeting took place there about the middle of February. This gathering was followed by one in London last week, at which there were represented practically all the English manufacturers and a number of German firms interested in the English trade. As the result of these various conferences, an International Convention of Mantle Manufacturers has been established, with a view to improving the conditions of the trade.

On inquiry, it is learnt that in many directions the business of mantle making has become unprofitable; and with the considerable advances which have recently taken place in the cost of the principal ingredients employed in the manufacture of mantles, an advance in prices has been found imperative. Price-cutting, it is pointed out, had reached such a pitch that, without some revision of mantle prices, the rise in the value of thorium must have proved disastrous in some directions. As a matter of fact, the makers generally have been "feeling the pinch;" and as proof of the absolute necessity for some re-arrangement, the statement is made that manufacturers representing practically the whole production of mantles are acting in accord to secure a "more healthy tone and betterment of the condition of the trade." One matter which has a bearing on the present state of affairs is the longer life of the inverted mantle, which has led to over-production, inasmuch as the factories were started originally to turn out the less lasting upright mantles.

Buyers will be glad to know that the increase now to be made in the price of the better-grade article will be very small; but, of course, the future trend of thorium values is uncertain. The thorium manufacturers claim that for many years they have been having a "bad time," and that even on the price they are charging to-day only a very small profit is realizable. On the present basis of cost, the mantle makers have decided to make an increase in the prices of their goods of so trifling an amount that they feel the retailers will not alter the selling rates to the public of the higher-grade mantles, which will not be affected so much as some of the lower priced ones. In other words, the advance which is being made will be not any more than the increased price of thorium demands, except in the case of the poorer grade goods, which have hitherto been sold at a loss, and will now have to show some small profit. As the result of this, it is hoped that a greater tendency will be created for the use of the better-grade goods; for as the two prices more nearly approximate to each other, there will be less inducement for people to go in for the cheaper kinds. This will really be a very good thing; for to the general rule that "it pays to buy the best," the incandescent gas-mantle is probably no exception. An unsatisfactory mantle usually means blame for the gas supplying authority (wherever the mantle may have come from); and those members of the staff whose duties bring them into more or less close contact with the consumer, will assuredly hail with delight a proposal which holds out some promise of an increased use of the "good" mantle, at the expense of his "imperfect brother." Of course, contracts already entered into at existing rates will be carried out.

RUSSELL'S HYGIENIC GAS-STOVE.

For Use in Bedrooms occupied by Sufferers from Chest Troubles.

"NECESSITY is the mother of invention." Through personal suffering from a bronchial affection, Mr. W. J. Russell, who for a great many years was the Secretary of the Croydon Gas Company, and is now a Director, some time ago set about inventing a method of maintaining, by the aid of gas, a constant current of warm (as desired) dry or preferably humid air in his bedroom throughout the night, and so keeping a uniform temperature. Some years ago Mr. Russell—being himself a sufferer—was interested in the warning and advice of (the late) Sir B. W. Richardson, M.D., F.R.S., to those worried by bronchial affection, or who were in a feeble state of health. He pointed to the danger of congestion of the lungs by the exposure of the bronchial surface during the hours of sleep to the action of chilled air; and his advice was to ward off this condition by maintaining the air of the bedroom at approximately the same temperature throughout the night. But Sir Benjamin recommended that the fresh warm air should be introduced into the room simply through a chamber or tube heated by gas or coal, which would have delivered parched air to the room, and which in some cases would without doubt have aggravated the discomfort. For his own relief Mr. Russell took the matter in hand, and produced a device which economically maintained the temperature of his bedroom throughout the night, by delivering into it warm air in a slightly humid condition, with which moist air he combines, if needed, a medicament or antiseptic. The relief he has experienced approaches to something that is almost a cure. There has from time to time been improvement on the invention; and in its present form it is about as perfect as it well can be. People suffering from bronchitis, from asthma, and from other chest troubles, who have tried the invention, have confirmed Mr. Russell's own experience.

The gas-fire is of the reflector type, fitted with five or more Bray flat-flame burners, and on top is a portable copper boiler, which is the vital part of the invention. When the five burners are alight, the stove consumes about 30 feet of gas per hour; but during the night a temperature of about 52° can be maintained on cold nights in an ordinary room (say, 17 ft. by 13 ft.) with a consumption, by two burners, of 8 cubic feet per hour. So that with gas at 2s. 6d., the warm moist-air-giving arrangement can be kept running for eight hours for a cost of not more than 2d. The relief obtained, if it could be appraised at a money value, is worth considerably more than this. In the body of the stove there is a well, with two separate night burners; and it is these which only consume the 8 feet per hour, and which heat the tank at the top of the stove. In this tank are fitted two air-tubes, and a loose partition in which are fixed three sliding-valves—one for filling the attachment with water, and for supplying and regulating the vapour or steam to be mixed with the warmed fresh air (the top of this valve being used as a tray to contain the medicament or antiseptic), and the other two for regulating or shutting off the cold air when required. The cover of the boiler is perforated so as to allow of the passage and distribution of the warm humid air into the room. The device is ingenious; and it effects with regularity and economy what is required to give the necessary relief to sufferers.

Anyone who is interested, and desires to ascertain the cost of the appliance, can obtain the information by addressing Mr. Russell at his private residence, No. 108, Park Lane, Croydon.

Industrial Uses of Gas.

Under the auspices of the Newcastle-upon-Tyne and Gateshead Gas Company, a lecture on the "Industrial Uses of Gas" will be delivered in Tilley's Rooms, Market Street, Newcastle, next Thursday afternoon, by Mr. H. M. Thornton, the Vice-Chairman and Managing Director of the Richmond Gas Stove and Meter Company, Limited. Mr. Thornton, it will be remembered, dealt with this subject in great detail on the occasion of the annual conference in London, last October, of the British Commercial Gas Association, of the Executive Committee of which he is a member, as well as of the Council of the Society of British Gas Industries. On Thursday he will discourse on the manufacture of tool steel in bar, give comparative figures for annealing by hard fuel and by town gas, and direct attention to various interesting processes in the metal and other industries carried out with gas. The appliances in operation will be on view from 3 p.m. to 8 p.m., when all who are interested will be welcome to inspect them; and experts will be in attendance to furnish information. Samples of various qualities of steel hardened in gas-furnaces may also be examined. The lecture will be illustrated by lantern slides.

NOTES FROM ABROAD.

German Coal for England.

The "Market Report" of the "Journal für Gasbeleuchtung" for Feb. 28 contains the following: "The reduction in the price of English coals foretold in a recent report has become a fact; it having fallen more than 1s. the last few days. If it is a fact that London gas-works have covered more than 1¼ million tons of their consumption with Ruhr coals instead of the usual English, this no doubt has a good deal to do with the reduction. It can also doubtless be assumed that the German middlemen, who are behind the Ruhr mines' business with the English companies, have achieved their purpose of securing the considerable quantities from the English mines which they have already speculatively sold to German gas-works in competition with native coals. Would it not be better for both economic and financial reasons for the Ruhr mines to sell their coal direct to East and North Germany, and so prevent the importation of English coal in such quantities as hitherto? The pressure brought upon English producers by means of German coals will without doubt recoil upon the heads of German buyers in English coal markets.

Gas for Ottawa.

According to "Gas Industry" (N.Y.), the Economical Light, Heat, and Power Company of Montreal is applying for powers to build gas-works and supply gas for Ottawa. The Company would manufacture gas from peat, and states that it could be supplied at 75 c. (3s. 1½d.) per 1000 cubic feet.

Gas Rentals.

A new system of meter reading and making out accounts is announced from Quincy, Ill. The town is to be divided into 26 districts—one for each working day of the average month. Each day all the meters in one district will be read, and the account rendered to the consumer two days later for his month's gas. The usual ten days will be allowed for claiming discount, reckoned from the date of the receipt of the bill.

Gas Consumption per Head.

Some interesting figures on this subject, compiled by Dr. Schirmeister, have appeared in the "Berliner Tageblatt." He gives as average consumptions per head of population and price per 1000 cubic feet for nine large cities in each country the following: England, 6566 cubic feet and 2s. 6d.; Holland, 4337 cubic feet and 3s. 5d.; Germany, 2683 cubic feet and 4s. 2d.; America, 6700 cubic feet and 3s. 7d.

Welding High-Pressure Mains.

According to some figures given by Mr. E. C. Jones in the "Pacific Magazine," economy results from employing oxy-acetylene welding for gas-mains. He showed that the old coupling formerly used, with a gasket, including labour, cost approximately $2; whereas the welded joint on an 8-inch pipe is made for 83·5c.—a saving of more than a dollar on each joint.

Continental Pipe Trade.

A keen struggle is in progress in the Continental pipe markets. A projected German ring having been frustrated, the Austrian works are said to be seriously contemplating a 50 per cent. decrease in the price of cast-iron pipes, which would mean anything from £2 to £12 10s. per railway truck-load. On the other hand, some French firms, in consequence of the German competition, have already had to reduce their staffs considerably owing to lack of orders.

A New Gas-Tubing.

The "Chemiker Zeitung" reports that Professor Traube, of Charlottenburg, has, after experiments with lime, glycerine, and powders, produced a new tubing which is very efficient for use as gas-piping. It is cheap; a metre costing only about 7d. It is also quite impermeable to gases, and will last in use several years without perishing. The heat resistance is said to be good, and its pressure-resisting capacity greater than that of rubber tubing. It is to be sold under the name of "Sonjatin."

A New Concession for Strassburg.

The gas-works at Strassburg are in the hands of the Continental Union Gas Company; and the Municipality have just entered into a contract with them by virtue of which a new company will be formed. The city will receive gratis 4001 shares of Mk. 1000 (£50) each in the new concern, and this will give them a majority on the Board of Directors. In return, the concession is to be prolonged till 1970. It is reckoned that the city's share of the profit last year will amount to Mk. 300,000 (£15,000).

Sound Mantles.

The Lindsay Gas Company, U.S.A., is pursuing a "better mantles" campaign. A point in their policy is to guarantee for 90 days the mantles they sell. Mantles which are unsatisfactory cause large numbers of complaints from consumers, which are lodged at the gas offices, and have to be traced-down, even if the Company did not sell the goods. They are advertising their guaranteed mantles widely in the Press, and recommend that companies should sell them at convenient places in the cities, so as to prevent consumers buying inferior qualities at the first stores they come to.

Coke-Ovens in Japan.

The "Chemiker Zeitung" recently commented on the great increase in recent years in the number of coke-oven installations in Japan, where markets for sulphate of ammonia, pitch, tar, oil, and naphthalene are good. The first plant in the country was one of 21 Semet-Solvay ovens, only a few years ago. This has lately been increased by the addition of 20 ovens. Following the example of the Government steel-works at Yawatamachi, which in 1907 installed 150 Semet-Solvay ovens, many private works now have their own bye-product ovens. At Omuta 60 Koppers ovens have a daily output of 3 million cubic feet of valuable gas and 3 tons of sulphate; and now 30 more ovens are to be added. A large firm in Ida has a Mond-gas plant which supplies gas for direct-coupled engines driving six dynamos of 1000 K.W. each. The same firm has started a school for the gas profession in Omuta, which is attended by 200 pupils.

Gas for Meat Smoking.

In the February number of the Bulletin of the National Commercial Gas Association of America is described a large installation where gas-firing is exclusively used for smoking meat, and for other purposes connected with the industry. This installation contains 32 separate smoke-houses, which hold an average of 28,000 lbs. of meat per house. The advantage of the use of gas is well illustrated by a test carried out: Two 28,000-lb. bacon houses were selected, one wood-fired, the other gas-fired. In the former, the process occupied 22 hours, the services of two men, 13/16 of a cord of wood was burned, and in the end the meat was so unevenly smoked that portions had to be re-smoked. In the gas-fired house, only 10 hours were required, 1870 cubic feet of gas were consumed, and the shrinkage was reduced by 37·2 per cent. Gas is also used extensively in the same factory for branding, singeing, tinning, &c.

German Contract Law.

An interesting case is reported in "Wasser und Gas" (No. 10), in which a certain firm contracted to take the whole of the coke available from a gas-works after local sales had been dealt with. They implied that they could take ten to twelve railway truck loads per month. After a time the gas-works found themselves unable to deliver as much as this, and the purchasing firm took the case to the courts. Judgment was given for the defendants. As a matter of fact, the judge found that there was no minimum quantity stated in the contract; it only being stated by the plaintiffs that they could take up to a certain quantity monthly; but he decided that the defendants were quite at liberty to make alterations in their working methods so that they had not so much coke for sale.

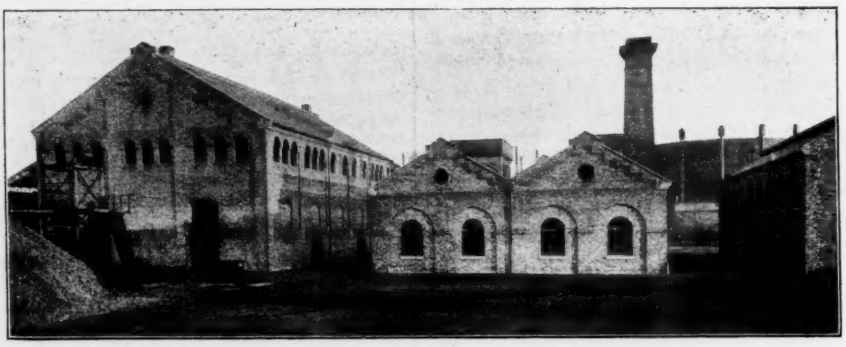
Softening Temperature of Pitch.

In a recent issue of the "Chemiker Zeitung" [Vol. XXXVIII., p. 63], a method of determining the softening temperature of pitch was described by M. Klinger. According to an abstract of his communication in the "Journal of the Society of Chemical Industry," discrepancies often occur owing to the present loose definition of Krämer and Sarnow's method. An exact internal diameter of 6 mm. is now proposed for the glass tube employed in the estimation. This is charged by dipping into a layer of molten pitch some 7 mm. deep, at about 150° C. After about a minute the tube is removed as with a pipette, and is rested with the lower end upon a cold glass plate. This gives a solid layer of about 5 mm. in thickness. Then 5 grammes of mercury are poured in, and the tube is finally transferred to a double water-bath at 40° C.; the temperature being raised by 1° C. per minute until the mercury sinks through.

Company Succeeds Municipality.

When a change of ownership of gas-works takes place, it is generally a case of the substitution of a local authority for a private company. At Tourcoing, a French frontier town about ten miles from Lille, a transfer in the opposite direction has just taken place. The works were formerly carried on by the Municipality; but they will in future be operated by a company to whom a concession for forty years has been granted. Whatever may be the result of working, the town will receive a sum of £20,000 per annum. Beyond this, as from 1916, they will get 10 per cent. upon the gas sold to private consumers per million cubic metres in excess of 7 millions, which will about represent the production of the works in the current year. At the expiration of the concession, the manufacturing and distributing plant and the meters, which will have been considerably improved and enlarged, will be handed over to the Municipality, who will come into possession of property for which the town will not have had to incur any financial burdens. The town will also receive a further sum, which has not yet been fixed, but which it is estimated will amount to about £8000. By the change they have made, the Municipality have not only relieved the town of responsibility, but secured for it a a very substantial income.

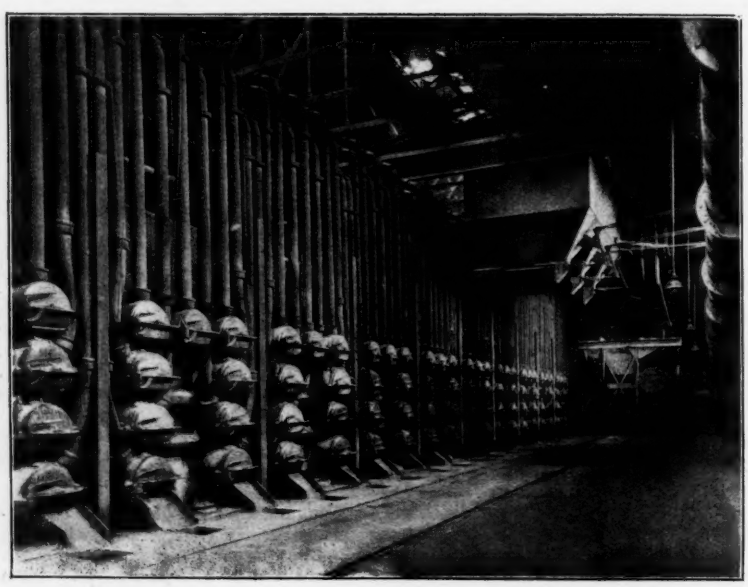
THE CHELTENHAM GAS COMPANY'S No. 2 STATION.



TWO VIEWS OF THE No. 2 STATION, CHELTENHAM GAS-WORKS.

By invitation of the Chairman and Directors of the Cheltenham Gaslight and Coke Company the shareholders were yesterday enabled (after a luncheon at the gas-works, Gloucester Road) to inspect the "No. 2 Station" newly erected on land acquired under the Cheltenham Gas Act of 1896, and--in the words of a *brochure* prepared for the occasion—"to inaugurate the successful operation of the modern plant . . . and be initiated into the mysteries of the latest developments of twentieth-century gas making."

Next week an account will be published of yesterday's proceedings; but meanwhile a few particulars of the works may be given to-day, culled from the booklet distributed among the visitors. They were reminded that the shareholders are "the present-day representatives of that excellent body of ladies and gentlemen—their names duly set forth in the preamble of an Act of Parliament—who in 1819 approached His Majesty King George III., and asked to be 'declared to be one body politic and corporate, by the name of the Cheltenham Gas Light and Coke Company.' Gas light had already been installed in the streets of Cheltenham in 1818, as recorded by Goding; so that the present occasion is nearly coincident with the celebration of a hundred years of gas supply in Cheltenham."



THE INTERIOR OF THE RETORT-HOUSE.

Coal Handling.

The new station is approached from the viaduct completed some 16 years ago to facilitate the delivery of coal to the old station. The method of unloading is by small tip-bogeys (filled from the railway waggons), which are pushed by hand along a narrow-gauge tramway, with interlacing roads and turntables, to any part of the coal stores.

The Retort-House.

The retort-house at the new station is built parallel with the viaduct. Looking down from the latter, the coal-breaker may be seen, where the incoming coal is broken to suitable size and afterwards elevated to the storage hoppers on each side of the retort-bench. The coal-breaker, the elevator, and all the retort-house stoking machinery were supplied by West's Gas Improvement Company, of Manchester. After the coal has left the railway waggons, it is not touched again by hand until it is finally deposited in the yard as coke.

The Carbonizing Plant.

The retort-bench comprises ten settings of nines—180 retorts in all. The charging and discharging machinery is driven by compressed air, which is produced in the power-house adjoining. The charge of coal in each retort is 4 cwt., and it undergoes carbonization for eight hours. On being discharged, it falls into a tip bogey; being quenched meanwhile by finely-divided streams of water from an overhead tray. At the end of each draw, the bogeys are raised to the coke gantry by means of a lift operated by a small compressed-air motor.

The Plant-House.

The gas passes to the plant-house, where it is treated by a battery of nine condensers. It then passes through a tar-extractor, to remove the remaining traces of tar, and thence to the power-house.

Power-House—Engines, Exhausters, &c.

The power-house, adjoining which is the boiler-house, contains the air compressor and gas exhausters. The compressor, of the two-stage double-acting type, is driven by a 45 H.P. steam-engine. It furnishes the motive power for the retort-house machinery and lift motor, and it also incidentally provides a highly useful air-blast for a small smith's forge in another part of the works. The exhausters, which are installed in duplicate, are by the Bryan Donkin Company, of Chesterfield, and comprise two exhauster units working in parallel. The engines are of the vertical type, with metallic steam packing and pump lubrication to all important points,

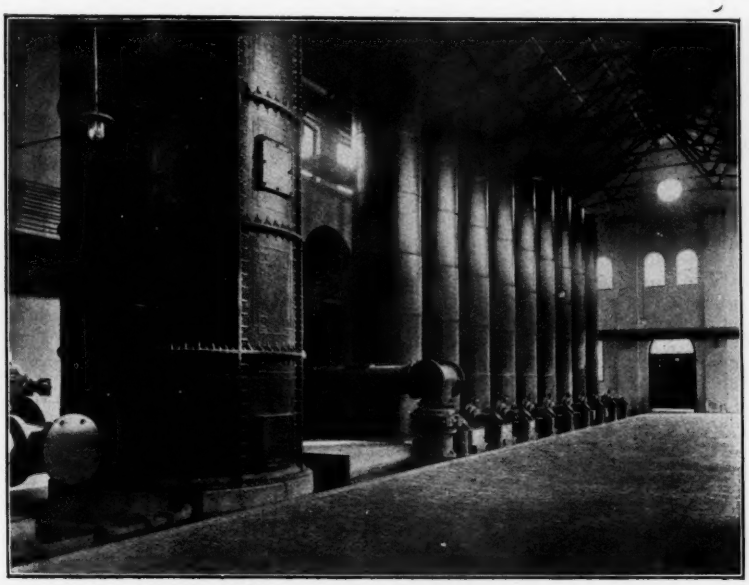
and give a very steady "turning moment" for the shaft which carries the exhauster blades. This is exemplified by a novel recording gauge which has been installed by Messrs. William Sugg and Co.

PURIFICATION.

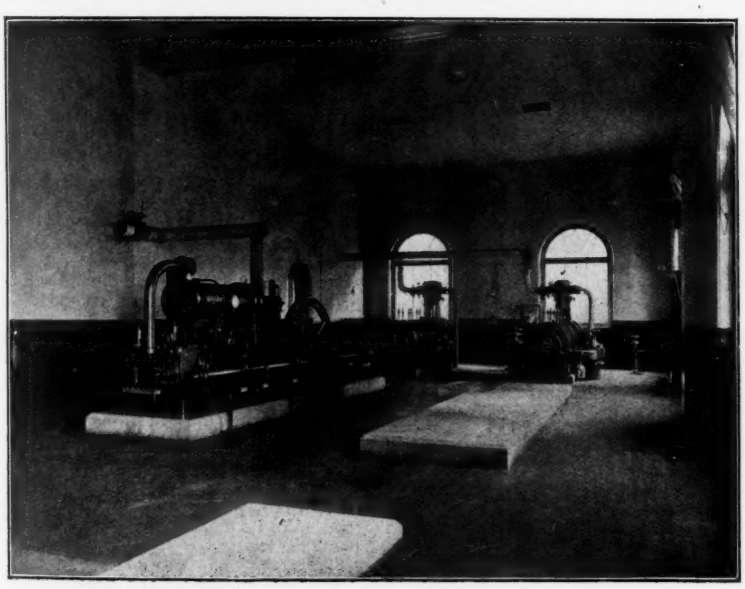
The gas on leaving the power-house passes through the tower-scrubbers, the washer-scrubber, and the naphthalene washer already mentioned, and thence to the purifiers. These are six in number (though they appear to be continuous from below), each 30 feet by 40 feet and 6 feet deep, filled with two layers of oxide of iron.

THE STATION METER.

Concerning this part of the plant, the *brochure* says: "The gas has now gone through all its various processes of preparation for use; and its last stage before going into the gasholders is that of measurement, which operation takes place in the station-meter house. The house seems large for its present apparatus; but, except that in length it is large enough to accommodate another similar sized meter, the height is only enough to permit of the raising of the huge meter drum if at any future time such an operation were necessary for repairs. The meter is of a type different from that favoured almost universally for the smaller consumer's meter. These latter are known as 'dry' meters; while the present station meter is 'wet.' It contains a large tinned-iron drum built upon a very strong cast-iron frame rigidly fastened to a central spindle; and the whole is partially immersed in water. The drum is divided into compartments, and the gas passes continuously into each section in succession, turning the drum and spindle by its steady onward flow; while the gas continuously passes out from the free edge of each compartment as it gradually sinks again into the water. It is almost impossible to visualize the operation from a written description; but, ingeniously simple as the drum construction is, it is interesting to remark that the wet station meter was one of the earliest pieces of gas apparatus to be invented, and with very slight modification of design (making for greater accuracy of registration), the original idea has persisted to the present day. The revolving spindle drives a train of cog-wheels, which indicate, by means of pointers, the amount of gas that is being made."



THE PLANT HOUSE AT CHELTENHAM.



THE POWER HOUSE AT CHELTENHAM.

OFFICES, LABORATORY, WORKSHOP, &c.

At the back of the meter-house are the coke weighing office, the superintendent's office, the testing-rooms where constant observations of the quality of the gas are made, the laboratory (which is not yet equipped), and a small fitter's shop, with forge and overhead store.

One last point is mentioned by the writer as worthy of note. "In the plant-house, purifier-house, and station-meter house, where naked lights at times might be dangerous, electricity has been made the handmaid of gas, and electric lights have been installed—the current being obtained from a dynamo and storage battery, which have been in use for some years at the old station."

STEAM-RAISING BY GAS-COKE.

By E. W. L. NICOL, A.M.I.E.E.

THE development of the principle of coal carbonization on broader lines, and the extending co-operation of centralized coal-carbonizing plants and electricity supply undertakings equipped with boiler plant designed to operate on surplus gas or coke fuel, suggest to the lay mind the mutual advantages that should accrue from the closer relationship between the gas industry and steam user.

The advantages enjoyed by those local authorities who operate both gas and electric power stations, where the gases and other valuable products are distilled from the coal on a scientific and economical basis at the gas-works and the coke passed on to the power station for conversion into electrical energy, do not appear to have been fully realized in this country; and unfortunately, although conceived with similar objects in view, the two undertakings have mostly developed along separate and divergent lines. Meanwhile, the ever-increasing surplus coke product of the gas industry mostly finds a market on the Continent, to the benefit of the foreigner; while raw bituminous coal is being used almost exclusively in this country for steam raising, notwithstanding the enormous cost and inefficiency of distillation in an ordinary boiler furnace.

Comparatively few engineers in charge of boiler plant can have any first-hand knowledge or experience of coke fuel for steam raising; and a few notes on the details of the subject, based on a knowledge of the possibilities and limitations of this fuel, may prove to be profitable and useful in promoting its wider adoption to this end. For the purpose of comparison, an average sample of ordinary bituminous steam coal (said to be washed), as used in some Metropolitan power stations, will be taken. An average of many analyses of this fuel shows that it contains:

Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Calorific Value (Dry).
Per Cent.	Per Cent.	Per Cent.	Per Cent.	B.Th U. per lb.
10 ..	45 6 ..	32 ..	12·4 ..	12,500

When consumed in a boiler furnace for steam-raising, if any degree of efficiency is to be attained, the coal must be heated until the volatile gases are distilled off. This process absorbs about 10 per cent. of the total heat in the coal. The distilled gases must then be liberally diluted with air, to burn them without excessive smoke production. This excess air must, of course, be heated to the furnace temperature, and is mostly rejected to the chimney as waste heat. As the diluted gas is ignited, it should be allowed to burn in a large brick-lined combustion chamber before coming in contact with the comparatively cool heating surfaces of the boiler, and the supply of air should be gradually diminished as the distillation process is completed. Meanwhile the solid residue or coke (which is smokeless, and requires about half the amount of air necessary for the complete

combustion of the gas, to burn it under the best conditions) remaining on the fire-bars, must be consumed in the same furnace at the same time. So it is evident that, whether the stoking be intermittent or continuous, too much or too little air is being admitted to the furnace.

The question of how to accomplish the apparently simple process of distilling and completely burning, simultaneously, gaseous and solid fuel in the same furnace, has formed the subject-matter of many patents. The complete and satisfactory solution of the problem is still far off; but the difficulties attending the process are being more generally recognized, and steam engineers are adopting low-volatile and high-carbon coal fuel where available at a reasonable cost.

Gas coke is practically a simple compound of carbon and ash, with little or no smoke-producing volatile matter. Uniform in quality and composition within fairly narrow limits, it requires no expert attention to obtain the most economical results during combustion; and the air supply to the furnace may be predetermined and fixed at the maximum desirable—the only adjustment left to the varying skill of the stoker being the fire thickness or density—one which cannot easily be neglected or abused.

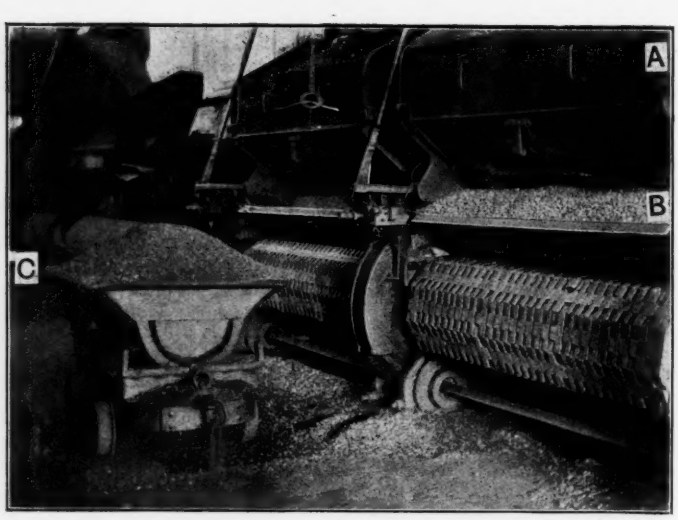
Eminent authorities on the subject are agreed that the higher the volatile contents of a fuel, the more it is liable to "smoke" or to escape from the furnace in a partially unburnt condition. The percentage of volatile matter in steam-raising fuel is in reality a measure of the difficulty of burning it under boilers with perfect combustion. Conversely, the lower the percentage of volatile matter, the greater the simplicity and efficiency of combustion. Low-volatile natural fuels are high-priced. They are known as anthracites and semi-anthracites; but the volatile contents of any solid fuel, as fired, may be adjusted to the most advantageous proportions by adding carbon in the form of coke.

The volatile contents of the coal detailed above might with advantage be adjusted by mixing with equal parts of coke as follows.—

	Carbon. Per Cent.		Volatiles. Per Cent.		Calorific Value. B.Th.U. per Lb.
Coal	45·6	..	32·0	..	12,500
Coke	88·0	..	2·5	..	13,000
	133·6	..	34·5	..	25,500
Mixture	66·8	..	17·2	..	12,750

An important electric power supply company, whose power stations are situated in a bituminous colliery district where the coal is purchased at comparatively low prices, found it advantageous to lower the volatile contents of the fuel as fired by adding coke breeze and broken coke. The average volatiles in the coal was 28 per cent. This was adjusted as required by means of the simple arrangement illustrated. An additional coke-hopper was fixed on the mechanical stoker, and arranged to feed the furnace with a layer of coke 4½ inches thick. The coal is fed from the coal-hopper above; the quantity being adjusted by raising or lowering the furnace door in the usual manner. A mixture of 75 per cent. of coke, which reduced the volatile contents of the fuel as fired to about 8 per cent., was consumed at a rate of over 30 lbs. per hour per square foot of grate area, with $\frac{3}{10}$ inch of natural draught over the fire. Where the fuels are hand fired, the mixing becomes an extremely simple matter—alternate charges of coke and coal being fired.

To steam users in London and in towns where the restrictions as to the emission of smoke from chimneys are exceptionally severe, the advantages of this method of obtaining practically smokeless combustion and improved efficiency should be invaluable, especially where inadequate boiler plant is being forced beyond its normal capacity, or where excess of air, anthracite or other expensive smokeless fuels, have been resorted to as the only alternatives.



A. Coal Hopper. B. Coke Hopper. C. Coke Breeze.

The Chain Grate Mechanical Stoker for Small Coke or Breeze.

Typical South Wales anthracite contains:

Carbon. Per Cent.		Volatiles. Per Cent.		Approximate B.Th.U. per 1d. of Cost, at, say, 25s. per Ton.
93	..	3	..	108,750

Good quality gas coke contains:

Carbon. Per Cent.		Volatiles. Per Cent.		Approximate B.Th.U. per 1d. of Cost, at, say, 19s. per Ton.
88	..	2·5	..	130,000

In using so-called smokeless coal at comparatively high prices when gas coke is available at reasonable cost, steam users may not, therefore, be operating their plant to the best advantage.

All bituminous fuels, when fired under boilers, require very careful management, and large brick-lined combustion chambers must be provided if they are to be consumed without excessive smoke or loss due to the escape of unburnt hydrocarbon gases.

Gas coke is smokeless, contains no hydrocarbons, and does not require any combustion chamber. It may with advantage be consumed in contact with the boiler-tubes and heating surfaces. Where gas coke is used, the combustion process is much easier to control, and the risk of loss in the form of unburned carbon (black smoke) and hydrocarbon gas is avoided.

All bituminous coals contain sulphur in dual form—fixed and volatile. On heating in a boiler-furnace, the volatile sulphur is liberated and burnt to form sulphurous acid gas (SO_2), which may cause serious damage by attacking the metal and furnace brickwork. The carbonizing process necessary to produce coke eliminates to a great extent this objectionable element. The injurious effects of volatile sulphur on boiler tubes and plates are not fully recognized. Many boiler-tubes, which had become weakened, bulged, and punctured after comparatively short service, have been cut across at the point of failure and examined by the writer, and in no case has evidence of internal corrosion been detected that would account for the reduction of the metal; but there have always been signs of corrosion on the external surface. In coke-fired water-tube boilers, tube failures due to this cause are comparatively infrequent.

Advantages of Gas Coke.

Compared with ordinary bituminous steam coal, as detailed above, the commercial and practical advantages to be obtained by using gas coke exclusively for steam raising, or by mixing it with bituminous coal slack in order to reduce the volatile constituent of the fuel as fired, are:

1.—Better value for money in useful heat units.

2.—Less unavoidable waste in consumption. Less excess air being necessary to effect complete combustion and the prevention of smoke, less waste heat is rejected to the chimney. The volatile gases having been distilled off at the gas-works, the cost of distillation and decomposition, which absorb about 10 per cent. of the total heat of the coal, is avoided, the heat available for the purpose of raising steam being increased accordingly.

3.—Entire freedom from smoke. Coal fuel deposits soot and tar on the heating surfaces of the boiler, which seriously impede the transfer of heat from the fuel to the water and steam inside. By using coke, all external heating surfaces are maintained in clean condition, and are so available for the rapid transfer of heat. Risk of prosecution under the Smoke-Prevention Acts is reduced, and the boiler plant may be forced up to its maximum capacity without the emission of black smoke.

4.—Gas coke having no volatile gases in process of distillation, its combustion can be quickly arrested, when necessary, by simply cutting off the air supply to the furnace.

5.—Gas coke does not sinter or fuse on the fire-grate or brickwork; thus helping to maintain a uniform and regular supply of air to all the fuel in process of combustion. The expenses attached to the upkeep of the furnaces are therefore correspondingly reduced.

6.—On coal-fired boilers, the varying skill of the stoker is known to produce a marked effect on the coal consumption; the variation being chiefly due to the abuse or neglect of the damper regulation and air supply to the furnace. Gas coke being of fairly uniform composition, the air supply to the furnace may be adjusted to the maximum desirable, and fixed conditions instituted.

Where the ratio of grate area to heating surface cannot be adjusted during periods of light load, boiler furnaces are banked—that is, the fires are heaped up with small coal in such a manner that comparatively slow combustion is obtained, while the steam pressure in the boiler is maintained at about its maximum, ready for use at short notice. As the volatile gases in the coal are distilled off by the heat of the surrounding brickwork, they must be rejected unburnt to the chimney, the damper being just eased to ensure this being done. Where a large number of boiler furnaces are banked twice daily for considerable periods, as in some electric power stations, the loss and waste due to this cause alone are considerable.

Gas coke used on banked fires should materially cut

down the stand-by losses, the whole of the fuel being used in maintaining the boiler and furnace temperature. The objectionable volatiles being absent, the damper may be kept practically shut, and the combustion controlled as desired; while the fires are maintained in such a condition that they may be urged and re-started at short notice in case of emergency.

In many modern steam plants where "fat" bituminous fuels are used, 8 to 9 per cent. of CO_2 in the flue gases is a fair average of the results obtained, and with this class of fuel 16 per cent. of CO_2 is about the highest attainable in actual practice. [Remember, 8 per cent. of CO_2 at ordinary flue temperatures corresponds to a fuel loss of about 23 per cent.]

Where coke fuel is used, which contains practically nothing beyond carbon and ash, the maximum proportion of CO_2 obtainable is 21 per cent. Under suitable conditions this figure may be approached in actual practice; while 15 per cent. is usually obtained at ordinary rates of combustion, the fuel loss being correspondingly reduced. [This 15 per cent. of CO_2 at ordinary flue temperatures corresponds to a fuel loss of about 12 per cent.]

The efficient combustion of 1 lb. of bituminous coal is a much more complex process than that of 1 lb. of carbon, owing to the various volatile and fixed constituents of coal requiring various proportions of air in order to complete their combustion. In ordinary boiler furnaces, the air supply cannot be so nicely divided that each constituent obtains the required amount and no more.

Carbon forms the most important combustible constituent of all natural fuels. Steam coal contains 45 to 80 per cent. of fixed carbon; gas coke contains 80 to 90 per cent. of fixed carbon. At equal cost and apparent heating value, gas coke is therefore better value for money in useful heat units.

The illustrations are intended merely to indicate a possible means of adapting coke fuel to a coking stoker designed to handle bituminous coal. Most boilers and mechanical stokers are usually designed and rated for coal fuel; but that is no good reason why they should not be adapted where necessary to use the more efficient coke fuel.

WORKS TOPICS—XXII.

By "Modus Operandi."

PUSHING THE SALE OF COKE.

IT is exceedingly gratifying to learn of the energetic efforts that are now being made by the London Coke Committee to push the sale of coke for the various purposes for which it is particularly suited. The work is evidently being undertaken in the right spirit, and a good deal of energy and enterprise are being displayed in carrying out the ideas of the Committee and of their fuel expert. Gas undertakings generally have so long—it is no good denying the fact—been altogether too apathetic about the whole question of coke sales. As a consequence, too much has been left to chance and contractors, with, as might be expected, bad results whenever a mild winter, or other adverse circumstance, has caused a slackening in the demand. It is, of course, a well-known fact that a spell of frosty weather does wonders in the direction of reducing coke stocks.

To those who realize the enormous quantities of coal that are burnt for steam-raising purposes, it will be clear how immense are the possibilities that exist for the use of coke in this market alone. Yet a few minutes' conversation with most of the engineers in charge of boilers will reveal a profound ignorance of the suitability of coke for this purpose. In most cases, the officials of gas undertakings are sufficiently well known to the manufacturers in their district to be able to approach them with the knowledge that their suggestions will at least have every consideration. And for this reason, gas undertakings are exceptionally well placed for selling coke equally as well as gas. The average factory boiler will burn anything from 500 to 1000 tons of coal a year; so that a few of such consumers will go a long way towards solving the problem that is so much in evidence at the present time.

It may be considered that the discussion of such a matter in this column is in the nature of a digression; but this is not altogether the case, for depending very largely on this question is the freedom with which the respective proportions of coal gas and carburetted water gas can be adjusted.

There are not many engineers who would, from choice, in the present state of the oil market, make carburetted water gas in preference to coal gas. Most would prefer to use these plants merely to adjust the stock of gas when necessary. The plant would be ready for emergencies, and as a reserve alone its existence is justified; so that, were the coke market to allow it, water-gas plants might be dropped without compunction. Given a good market for coke, a large sum of money would be saved; for in many a works at the present time the manufacture of carburetted water gas is exceeding by from 25 to 50 per cent. the cost of making coal gas. Again, if water-gas plant could be shut-down, the additional coal gas to replace it would cost less in proportion per 1000 cubic feet than the quantity previously made.

Assuming that it takes 15 men to make 1 million cubic feet of carburetted water gas per diem, and 45 men to make 3 million cubic feet of coal gas, it would probably be possible, given the plant, to make the additional million cubic feet of coal gas by increasing the number of men employed by (say) six; thus saving the labour of nine men by the change. There would be additional and substantial savings in other directions; for wear and tear, which is so heavy an item on the side of coal-gas manufacture, would, with additional coal-gas plant employed, be considerably decreased by reason of the extra gas made. The same argument would apply, in a less degree, to other items in the cost of making coal gas.

The net result of such a change, presuming that the coke can be sold at a reasonable price, would be that the cost of making coal gas would be reduced by (say) 10 per cent., and there would, further, be the saving on the reduced expenditure in making the cheaper gas. But—and it is spelt with a big "B"—could the extra quantity of coke be sold at a reasonable price? I am optimistic enough to think that in most districts this could be done were the whole matter handled in a really enterprising manner. By scores of people, both private individuals and manufacturers, coke is practically ignored; but it need not be so. Until such a market is built up, it would be very unwise to shut-down water-gas plants, except, perhaps, in those very few districts where coke is always in demand.

What are wanted at the present time are ample data, as is suggested in the "JOURNAL," to enable the sale of coke to be undertaken in a thoroughly businesslike manner by men who have facts and figures at their finger tips. If these are absent the matter will not be receiving the attention it deserves. I shall, therefore, await with interest the publication in the "JOURNAL" of all the information that should be forthcoming when the results of actual tests, now being conducted in numbers of factories, are disclosed. Such data should have the fullest publicity to enable gas engineers generally to take advantage of the experiences of others—to the common good.

DEPOSITS IN "STANDARD" WASHERS.

IN the "Journal für Gasbeleuchtung" for Feb. 21 appeared a communication on this subject by Dr. Robert Funk, of Charlottenburg, who said he had had some experience with a simple and efficient method of preventing deposits on the "bundles" or other revolving parts of "Standard" washer-scrubbers, which often gave much trouble.

The formation of this deposit, he says, is due to the hardness of the water used for scrubbing. It generally occurs only in the last two chambers of the washer, through which the water flows first; and it is caused by the action of the ammonia in the gas. This being understood, it was aimed at effecting the separation of the deposit before the water entered the apparatus at all. A few experiments showed that the reaction took place only very slowly, accompanied by the formation of a fine precipitate. Therefore care had to be taken that enough time was allowed for the formation of the precipitate before the water entered the apparatus, and also for the precipitate to collect and settle.

Supplies of pure water and gas liquor were accordingly brought together at the lower end of a vertical length of cast-iron pipe. The diameter of this pipe must be such as to allow the reactions in the slowly rising liquid to be completed, and most of the precipitate to sink to the bottom. This is collected in a catch-space at the bottom of the pipe, and emptied out from time to time. In order to obviate any filtering of the water, it is trickled through two ordinary brushes, on which the last traces of precipitate are deposited.

In the Charlottenburg Gas-Works II, where this particular system has been employed for some six years, no trouble is ever experienced with the "Standard" washers, whereas the cleaning of the "bundles" used to occupy several weeks every year. The quantity of gas liquor which must be added depends on the hardness of the water and the strength of the liquor. Generally quite a small percentage suffices; but it is as well not to be too sparing, because the efficiency of the washer is not affected by the presence of a small excess of liquor. The ammonia in the liquor is usually acted on by the sulphuric acid of the gypsum which the water contains; and in this form it is not volatile. The whole arrangement can be so easily installed in any works, that it is practically costless.

A meeting was held last Saturday week, at the Cutlers' Hall, Sheffield, for the purpose of inaugurating a Local Section of the Junior Institution of Engineers, with Sheffield for its centre. The preliminary arrangements were in the hands of Mr. R. J. Stanley, of Rose Bank, Totley Brook Road, Dore, near Sheffield.

The will of the late Mr. John W. Field, formerly Secretary and General Manager of the Gas Light and Coke Company, has been proved at £25,079, with net personalty of £20,559. He left to his man-servant, Harry Botting (if in his service at his death) the freehold cottage at Dorking now occupied by him, and £100; and, on the death of his sisters, legacies are payable of £2000 to the Bishop of Barking, for the completion of the Church of St. Michael and All Angels, Beckton; £1000 each to seven hospitals and homes in which he was specially interested; and £500 each to seven other orphanage and homes named in his will. The testator left to the Court of Directors of the Gas Light and Coke Company the silver tea and coffee service and salver presented to his late father by officers of the Imperial Gas Company.

PROFESSIONAL ACCOUNTANTS AND GAS BILLS.

By the Writer of "Notes from Westminster."

The London Association of Accountants appear to be consumed at the present time by a desire to have their dignity recognized by Parliament, their status placed on an equality with the older chartered and incorporated organizations, and to give as much trouble as they possibly can by opposing Bills in Parliament. They have petitioned against several Gas Bills this session; and their voice has already been heard in the Court of Referees in applying for *locus* in connection with the Kidsgrove Gas Bill. They were unsuccessful, and quite rightly. The petitions they have presented remind very much of the campaign of the Alkali Manufacturers' Association of two sessions since.

The whole trouble arises over the fact that, in the special purposes fund clause, which is only a few years old—fewer than the age of the London Association of Accountants (which was born in 1905)—it has hitherto been provided that the "fund shall be applicable only to meet such charges as a chartered accountant or incorporated accountant, being an auditor of the company, or appointed for the purpose by the Board of Trade, shall approve." The London Association want to know why their organization should not receive equal recognition, or at least why the clause should not be left open to all who follow and practise the profession of accountancy. The members regard it as being very unfair that any particular organization or organizations should be recognized by the Parliamentary Authorities and not others, and that there should be any unequal treatment. Before the Association appeared as petitioners against Bills, they had successfully gained the ears of the Parliamentary Authorities, who sympathized with their representation that no favour should be granted to one society or association more than to another. It is not known whether the Parliamentary Authorities stopped to inquire why the members of the London Association were not members of the chartered or incorporated organizations, and whether the qualifications for membership of the Association were as high as those of the chartered and incorporated bodies. However, the point at issue in the special purposes fund clause was in the model for 1913 altered to the "fund shall be applicable only to meet such charges as an accountant appointed for the purpose by the Board of Trade shall approve." This is a very clumsy and unnecessary alteration; and so many promoters this session have thought so that they passed over the new model, and kept to the form of the old one. In the first place, why should there be any necessity to apply to the Board of Trade for the appointment of an accountant, when a fully qualified one, and a member of the chartered or incorporated bodies, is already the auditor of a company? And this may be distinctly emphasized: Gas accountancy is a "special line;" and just as we of the gas industry are convinced that it is correct there should be a compulsory weeding-out of unqualified shareholding auditors of gas companies by the stipulation that chartered accountants shall be employed for auditing purposes, so are we persuaded that special knowledge of gas accounts and circumstances is requisite before placing such a power as the approval of the administration of such a fund as the special purposes one in the hands of any accountant. Great care is absolutely necessary; and selection should be made by those best qualified to make it. There is (this is said with all respect) a risk attaching to appointments that might be made by the Board of Trade; and it is quite unnecessary to impose the duty of selection or appointment on the Board.

The chartered and incorporated bodies of accountants have always been the recognized ones; and there does not appear to be any need to extend the number so far as gas measures or gas undertakings go. Not being in or of the world of accountancy, one does not know why the London Association ever came into existence. Is it because the members are not qualified for membership of the chartered or incorporated bodies? If it is, then there is all the more reason why the clause in question should not be made more elastic. But there is a simple way out of the difficulty, instead of trying to move heaven and earth (so far as they exist at Westminster) to get official recognition; and that is for those members of the London Association who have any ambition in the matter of the administration of special purposes gas funds to (if qualified) join the chartered or incorporated bodies. It is not easy for an outsider to understand what the accountants want with so many organizations. But those in charge of gas undertakings desire the best qualified accountants they can get; and they have been taught to look upon membership of the chartered or incorporated bodies as the hall-mark of high qualification, and that suffices. With this position, there is no necessity for the Parliamentary Authorities or the Board of Trade to interfere. The remedy lies in the hands of every individual accountant—the obtaining of admission to the chartered or incorporated organization. If a man cannot gain admission, then it is his own fault—not that of the gas industry. The interest of the gas industry lies in an unquestionable assurance of the best qualifications for its special and responsible work.

At the meeting of the Royal Society last Thursday, the President announced that Mr. John Dewrance had presented £2000 to the donation fund of the Society. The income arising from this fund is applied mainly to promote experimental researches.

LOCAL LEGISLATION, 1913.*

The valuable and unobtrusive work done in legislating by Private Bills for local requirements is, of course, familiar to all interested in gas matters; and many of our readers are themselves actively engaged in planning administrative and other developments to meet the ever-growing necessities of their local affairs and undertakings, parliamentary authorization for which will be required. The classical history of Private Bill Legislation is, as is well known, to be found in Clifford's valuable (and now somewhat rare) two volumes; and a short statistical summary of "The Rise and Development of Local Legislation by Private Bill" formed the subject-matter of a presidential address by the late Earl of Onslow in 1906.

Apart, however, from the wider historical standpoint of local legislative measures, there are, as it were, the detailed mosaics of the varying designs to be filled in. As regards the gas industry, the forms of these different details are recorded in the "Journal" in the periodical reviews and analyses of Gas Bills and Gas Acts from year to year. Since 1909, Mr. Frank Noel Keen, Barrister-at-Law, has compiled an abstract of some of the more important of the provisions in local Acts obtained by corporations and councils. "Local Legislation, 1909 to 1911," was the first volume published. This was followed by a supplement for 1912; and now "Local Legislation, 1913," the third volume of the series, has just been published, and is submitted to us for review.

Sixteen Acts (and about 1400 sections), among which are those of the Corporations of Aberystwyth, Bradford, Derby, Hove, Leicester, Liverpool, Morley, Southend, Southport, and West Bromwich, have their principal provisions grouped according to subject matter; the whole being classified into divisions—such as Part I., dealing with Streets, Buildings, and Watercourses; Part II., Prevention of Disease, Protection of Food, &c.; Part VII., Water Supply; Part VIII., Gas Supply; Part IX., Electricity Supply; Part X., Provisions affecting both Gas and Electricity Undertakings; and so on. It is an altogether admirable compilation, and the numbering of each paragraph lends distinction and clearness to the text; while the full table of headings at the beginning, and the ample index at the end, greatly facilitate any reference that may be desired to be made.

Both as a record of existing legislative enactment, within the limits laid down, and as a guide to those promoting future Bills, the publication is calculated to be of considerable service. For instance, supposing the doubt be as to the power to lay pipes in streets not dedicated to public use; the index refers us to page 122, upon which we find paragraphs giving the sections applicable in the case of the Derby, Lymm, Barry, and Aberystwyth Acts. Or, again, should it be a question of bye-laws for preventing waste of water, paragraph 427 informs us as to the terms of section 25 of the Lymm Urban District Council Act, 1913. And so on, for such points as a separate communication pipe for each house, the supply to houses partly used for trade and to public institutions, powers to supply fittings, penalties for injuring meters, &c.

Turning to Part VIII., "Gas Supply," we find there are 68 paragraphs devoted to the subject. The index again stands us in good stead; for under "Illuminating Power of Gas," we are referred to various provisions in the Mynyddislwyn Act—a name, by the way, that one would rather have to copy than spell or pronounce. Also, under the heading, "Substitution of Standard Calorific Value for Prescribed Illuminating Power," we have section 15 of the Morley Corporation Act, 1913, amply set out, by virtue of which

> "(*b*) The Corporation shall cease to be under any liability or obligation to provide or maintain at any testing-place within the gas limits any apparatus for testing the illuminating power of such gas, but shall be at liberty to remove from any testing-place any such apparatus which they have provided thereat: . . . .
>
> (*d*) The gas supplied by the Corporation shall . . . . be of a standard calorific value of 540 British thermal units gross per cubic foot . . . ."

So, too, the penalties that will be incurred for deficiencies in calorific value are given [Morley, section 17], and the non-liability for penalties for the presence of sulphur compounds other than sulphuretted hydrogen [West Bromwich, section 101]. Other headings that catch the eye are: Specification and laying of pipes between gas-main and consumer's meter; anti-fluctuators for gas-engines; supply of gas where consumer has separate gas or electricity installation; and power to lay pipes for purposes ancillary to gas business. Under each of these, and other, headings the appropriate sections of different Acts are cited.

Enough has been said to show the general scope and utility of Mr. Keen's compilation. Our only regret is that it is not wider and more comprehensive still. As far as it goes, it serves, *inter alia*, as an admirable subject-matter index and digest of the Gas Acts, details of which are, as previously stated, always to be found in the columns of the "Journal."

The set of books referred to may be had, before the 31st inst.,

* "Local Legislation, 1913; Being a Collection of Provisions contained in Private Acts of Parliament obtained by Provincial Corporations and Urban District Councils in England and Wales, after Consideration by the Local Legislation Committee of the House of Commons." Compiled and arranged by Frank Noel Keen, LL.B., Barrister-at-Law, of the Parliamentary Bar. London: Walter Southwood and Co., Limited; 1914.

at the price of 16s., after which date the price of the set will be raised to 25s. net. The particular volume under review, "Local Legislation, 1913," is now to be had for 7s. 6d. net. We feel sure it will be of use for reference and guidance to many gas and water engineers and administrators.

REMOVING BISULPHIDE OF CARBON FROM GAS.

A Comparison of Processes.

THE current number of the "Journal des Usines à Gaz" contains a communication by M. Ch. Ab-der-Halden, the Engineer-Chemist of the Continental Union Gas Company, dealing with various processes for purifying gas from bisulphide of carbon.

After some introductory remarks, he points out that methods actually in use may be grouped into two classes, in one of which an attempt has been made to cause the bisulphide of carbon to enter into chemical combination, thereby yielding a recoverable product capable of industrial utilization; while in the other the object has been simply to destroy the bisulphide, either by dissociating its constituent elements, or else by transforming it into sulphuretted hydrogen, removable in the well-known manner.

After briefly referring to the early labours of King and Patterson, the author comes to the alkaline process, founded on the works of Pippig, Frachmann, Mayer, and Fehlmann, who utilized the affinity of bisulphide of carbon for aniline, and employed this base as a purifying material after having mixed it with oxides of iron with the object of increasing its activity. Owing, however, to the high price of aniline, this process never came into use. The discovery by Cross, Bevan, and Beadle, in 1892, of the reactions resulting in the formation of xanthogenate of cellulose gave birth to a method of purification which permitted not only of the retention of the bisulphide, but its subsequent utilizable combination. If pure cellulose is treated with an equal quantity of caustic soda, the result is the production of a voluminous and friable material to which has been given the name of "alkalized cellulose," and which has the property of fixing the bisulphide of carbon and giving a xanthogenate of cellulose. This reaction, effected in solution in an excess of soda-lye, yields as a final product a viscous material to which has been given the name of "viscose," and which constitutes the prime matter in the preparation of artificial silk. The author gives in detail the reactions forming the basis of the "Athion" process, which, it may be remembered, formed the subject of a paper read by Herr F. Kuckuk at the meeting of the German Association of Gas and Water Engineers at Strassburg in June last year. Herr Kuckuk is the Manager of the Heidelberg Gas-Works, where the process has been tried; and an abstract of his paper was given in the "JOURNAL" for July 1 (p. 34). M. Ab-der-Halden remarks that the activity of the material is considerable; a ton being capable of absorbing 275 lbs. of bisulphide of carbon. Consequently, gas containing 100 grammes [1540 grains] of sulphur per 100 cubic metres [3530 cubic feet] can be purified, by this quantity of material, to the extent of 100,000 cubic metres [about 3½ million cubic feet]. The Heidelberg experiments showed that the action of the alkalized cellulose reduced the sulphur content of the gas by 75 per cent.—from 70 to 18 grammes per 100 cubic metres.

M. Ab-der-Halden next deals with the processes for the removal of bisulphide of carbon by destruction. He first directs attention to the paper on the contamination of gas in holders submitted by M. Guillet to the Société Technique du Gaz en France in 1912,* in which he described a method for the destruction of bisulphide of carbon based upon the following reversible reaction of this compound upon aqueous vapour at a temperature above 100° C.:

$$CS_2 + 2H_2O \rightleftarrows CO_2 + 2H_2S.$$

It is claimed that if care is taken to eliminate, by the usual processes, the sulphuretted hydrogen as it is produced, all the bisulphide of carbon is destroyed, and there remains in the gas only an infinitesimal proportion of sulphur. The process consists essentially in passing the gas into an oxide of iron purifier heated above 100° C. M. Guillet's experiments allowed of the following conclusions being drawn: Above 25° C., a gas passing through an oxide of iron purifier gets rid of an appreciable proportion of its bisulphide of carbon; but the reaction is too slow for purification to be complete. At 100° C., when the water carried by the gas is vaporized, the speed of the reaction is considerably increased—in fact, to the point of becoming industrially applicable. Though the experiments of M. Guillet have up to now been purely theoretical, they have nevertheless shown that gas containing on an average 44 grammes of bisulphide of carbon per 100 cubic metres has only 9·6 grammes after its passage through a heated purifier. M. Ab-der-Halden says that the application of this reaction in practice may give rise to technical difficulties; but it seems that the process of hot purification constitutes one of the most ingenious attempts that have ever been made to remove bisulphide of carbon from gas.

The author next turns to the process of Mr. E. V. Evans, in use by the South Metropolitan Gas Company; and he remarks that it is really the only one which has been practically applied. He explains that the elimination of the bisulphide of carbon is effected by its catalytic hydrogenation by means of nickel, heated to a temperature of 400° to 500° C. The sulphuretted hydrogen formed is retained by the oxide of iron; and the carbon, deposited upon the catalyzer, is burnt periodically by a current of air.* M. Ab-der-Halden says it is rather curious to see a catalyzer so sensitive as nickel applied in an atmosphere containing a notable proportion of sulphuretted products. From the first, the experiments of Sabatier and Senderens showed that sulphur played, with regard to catalytic nickel, the part of a veritable poison; and the subsequent applications of catalysis have confirmed this. But, on the other hand, the author of the process under consideration affirms that the composition of the gas does not vary after its passage over the catalyzer; and it would have been fairly logical to expect, under the catalytic influence of the nickel, the hydrogenation of the carbonic oxide, and its partial transformation into methane. It is, therefore, permissible to suppose that the nickel enters into reaction with the sulphur, and that this temporary combination is afterwards destroyed by the hydrogen, with formation of sulphuretted hydrogen and regeneration of the nickel. Without entering into reaction, the porous nickel could simply favour the calorific destruction of the bisulphide of carbon, thus

$$CS_2 + 2H_2 = 2H_2S + C.$$

In fact, experiments carried out by Mr. Papst at the gas-works at Portland (Oregon) have shown that simple reheating of the gas, without contact matter, was sufficient to eliminate almost the whole of the bisulphide of carbon. The most suitable temperature is 620° C. The Evans process operates between 400° and 500° C.; and it would be possible for the porous nickel, furnishing a large surface contact between the gas and the calorific mass, to lower the temperature of decomposition 200° C. Whatever may be the reaction which brings about the destruction of the bisulphide of carbon, this impurity is almost entirely removed; purification having permitted of the reduction of the proportion of sulphurous products within limits ranging between 74 and 86 per cent.

In bringing his communication to a close, M. Ab-der-Halden says it would be premature to make a comparison between processes so diverse as those he has dealt with, of which, moreover, only one has been practically applied. At first sight, the "Athion" process is the most attractive, as, while getting rid of an impurity, it produces two interesting bye-products—hydrated cellulose and liquid carbonic acid. At the same time it must be noted that this process necessitates complete purification of the gas from carbonic acid, and that any error in carrying on this operation—always possible in the course of working—may render inactive the purifying matter for bisulphide of carbon. It is affirmed, however, that the carbonate of potash may be used indefinitely. M. Ab-der-Halden thinks it is logical to suppose that at the end of a certain time the carbonate solution must necessarily become contaminated by the impurities inevitably contained in the gas, and that purification, or even costly replacement, will be indispensable. In this sense the "destruction" processes appear to be better suited for general working, and less liable to be affected by the accidents of manufacture. It must be remarked, however, that the Evans process requires a comparatively high temperature, and that the cost of fuel constitutes nearly half the expenses of purification. In this respect the Guillet process, which works at low temperature, and utilizes a purifying material of small value, should, it is thought, effect the extraction of bisulphide of carbon from gas under the best technical and economical conditions.

* See "JOURNAL," Vol. CXVIII., p. 986.

* The process was described in a paper read by Mr. Charles Carpenter, D.Sc., at the last meeting of the Société Technique du Gaz en France; and a translation of it was given in the "JOURNAL" for July 1, 1913 (p. 30). The plant was illustrated in the course of an article on p. 491 of the same volume.—ED. J.G.L.

Manchester and District Junior Gas Association.—The fourth of a series of lectures arranged to be held in the Manchester University will be given by Mr. J. W. Mellor, D.Sc., of Stoke-on-Trent, on Saturday, March 7, at 3 o'clock. The subject will be "Refractory Material as used in Gas-Works, and Testing of Same." After the lecture, tea will be provided at Carlton House. At 5.30, there will be an informal discussion on "Do Juniors Progress, and by What Means can they be Better Fitted for the Profession."

Mr. Hack's Will.—The late Mr. Henry Hack, M.Inst.C.E., of Langley Gorse, for many years (prior to 1908) Chief Engineer of the Birmingham Gas Department, left estate of the gross value of £35,937, of which the net personalty has been sworn at £35,667. Testator left £100 each to the Birmingham General Hospital and Queen's Hospital, and £100 upon trust to be distributed to the workmen's benevolent funds of the various City of Birmingham Gas-Works, after consulting the secretary thereof. He also left legacies to relatives and servants.

Society of British Gas Industries.—The annual general meeting of the Society will take place at the Trocadero Restaurant, Piccadilly Circus, on Thursday, the 19th inst.—Professor Harold B. Dixon, Ph.D., F.R.S., the President, in the chair. Afternoon tea (by invitation of the President) will be followed by a general business meeting. Thereafter the President will deliver his address; and then there will be the induction of the new President (Sir Alfred Keogh, K.C.B., LL.D.). The proceedings will conclude with dinner and a musical entertainment.

FURTHER AS TO SURFACE COMBUSTION.

It was in 1911 that Professor W. A. Bone, D.Sc., Ph.D., F.R.S., delivered, before the Royal Institution, two afternoon lectures, in which he described the scientific work that had been to that time accomplished in connection with surface combustion, and the prospects that existed in connection with the practical application of the system to industry and domestic service. Since that time experience has been built up; and the system has, in industrial operations, been under the observation of technical and practical men, and away from the supervision of those who have been working to the end of its practical application. At the weekly evening meeting at the Royal Institution last Friday, Professor Bone, as it were, reported progress. He had a distinguished audience, who applauded both his experiments and the information he was able to lay before them as to practical applications, and this indicated that there were few sceptics present.

Early Work.

It was not to be expected that the whole of those who occupied seats in the famous theatre had heard of the early work that had been done in connection with surface combustion, but which work, while directive to Dr. Bone and his associates, never reached, until they took it in hand, a stage at which practical application was realized. Therefore Dr. Bone lightly sketched the fundamental work, and did it in a manner that all who heard, to whom it was new, could not fail to appreciate its development from inception to the present stage. We heard again of the work of Sir Humphry Davy in 1817, of that of William Henry and Thomas Graham in 1825-9, in this country, and more particularly of that of Dulong and Thénard, and independently of Döbereiner in France; and then of the celebrated controversy between Faraday and De la Rive in 1834-5. Other names were mentioned. Subsequently it was recalled how there was a notable demonstration of realizing flameless incandescent surface combustion in contact with metals other than those of the platinum group by Thomas Fletcher in a lecture at the Manchester Technical School as far back as 1887. He injected a mixture of gas and air on to a large ball of iron wire; flame being used at first in order to heat the wire to the temperature necessary to induce a continuous surface combustion. On extinguishing the flame by momentarily stopping the gaseous mixture, the combustion continued without any flame, but with an enormous increase of its temperature. Fletcher grasped three important points—viz., that "this invisible flameless combustion is only possible under certain conditions;" (2) that "the combustible mixture shall come into absolute contact with a substance at high temperature;" and (3) that "in the absence of a solid substance at a high temperature, it is impossible to cause combustion without flame." So far as Professor Bone is aware, Fletcher did not follow up the matter beyond this point, either in its theoretical aspects or its practical applications; and his work had little influence on contemporary opinion or practice.

The Investigations of Twelve Years Ago and Since.

The lecturer came to his own investigations in 1902, which proved beyond all question (1) that the power of accelerating gaseous combustion is possessed by all surfaces at temperatures below the ignition point, in varying degrees dependent upon their chemical characters and their physical texture; (2) that such an accelerated surface combustion is dependent upon an absorption of the combustible gas, and probably also of the oxygen, by the surface, whereby it becomes activated (probably izonized) by association with the surface; and (3) that the surface itself becomes electrically charged during the process. Certain important differences between homogeneous combustion in ordinary flames and heterogeneous combustion in contact with a hot surface from a chemical point of view were established, so that there can no longer be any doubt as to the reality of the phenomenon. The fact that such catalytic combustion depends upon an intimate association of the surface with the combining gases was beautifully illustrated by two photomicrographs of the surface of a silver gauze taken before and after a long series of experiments, in which it was employed as the catalyzing medium for the combination of hydrogen and oxygen at 400° C. The next contention of the lecturer was that, if hot surfaces possess the power of accelerating gaseous combustion at temperatures below, or in the neighbourhood of, the ignition point, the same power must also be manifested in an even greater degree at higher temperatures, and especially so when the surface itself becomes incandescent. There are, indeed, experimental grounds for the belief that not only does the accelerating influence of the surface rapidly increase with the temperature, but also that the differences between the catalyzing powers of various surfaces, which at low temperatures are often considerable, diminish with ascending temperatures, until at bright incandescence they practically disappear. These considerations (as our readers well know) brought to Professor Bone, some years ago, the conviction that, if an explosive mixture be either injected on to, or forced through, the interstices of a porous refractory incandescent solid under certain conditions, a greatly accelerated combustion would take place within the interstices or pores, and the heat developed by this intensified combustion would maintain the surface in a state of incandescence without any development of flame—thus realizing the conception of flameless incandescent combustion as a means of greatly increasing the general efficiency of heating operations wherever it can be conveniently applied. Then Professor Bone disposed of those critics who, while admitting the accelerating influence of an incandescent surface upon gaseous combustion, are sceptical about the process being really flameless.

The force of such objections largely disappears on getting to close quarters with the phenomenon, and realizing how extremely slow a transaction flame combustion really is when considered in terms of molecular time. To illustrate how a flame may be extinguished by the introduction of an active catalyzing surface, Professor Bone performed an experiment devised by Professor the Hon. R. J. Strutt. A bulb (300 c.c. capacity) was filled with rarefied nitrogen, at a pressure of $\frac{1}{10}$ mm., and in a side tube was placed an oxidized copper wire which fitted it as closely as was consistent with easy sliding. Subjecting the nitrogen to a powerful electrodeless discharge, it was transformed into an active condition. The gas continued to glow brilliantly, owing to the fact that the active modification was reverting to the ordinary kind, producing a luminosity which might be regarded as a condition analogous with flame. The glow was visible for ten to fifteen seconds during the process of chemical reversion. Repeating the experiment, and tilting the bulb so that the copper wire dropped into the glowing gas, the luminosity was instantly extinguished, owing to the whole of the chemical action being concentrated at the catalyzing surface and instantaneously completed there. In this experiment, the lecturer believes there is a close analogy to what he conceives as occurring when an incandescent surface is employed to accelerate ordinary gaseous combustion—the action is so concentrated at the surface that a substantially flameless effect results. "I want," he added, "to emphasize the fact that the incandescent solid plays a specific rôle in this surface combustion. It is no mere idle looker-on at the surging crowd of reacting molecules which swarm around it. On the contrary, it so galvanizes and incites the dormant affinities between the combustible gas and the oxygen that the stately minuet of ordinary combustion gives place to the wild intoxication of the Venusberg." Over which graphic description there was much applause. It was admitted by the lecturer that the manner in which the surface acts is still a matter of conjecture, but the fact that it so acts can no longer be disputed. It is known, however, that incandescent surfaces emit enormous streams of electrons travelling at high velocities; and the actions of these surfaces in promoting combustion may ultimately be found to depend on the fact that they bring about the formation of layers of electrified gas in which chemical changes proceed with extraordinarily high velocity.

Application of Surface Combustion.

The lecturer passed from the theoretical considerations to the practical, and sketched first the more important features of the two processes of incandescent surface combustion evolved at the works of Messrs. Wilsons and Mathiesons, Limited, of Leeds, under his own direction, with the assistance of Mr. C. D. M'Court. In these processes, as most of our readers are aware, a homogeneous explosive mixture of gas and air in the proportions for complete combustion (or with air in slight excess) is caused to burn without flame in contact with granular incandescent solid, whereby a large proportion of the potential energy of the gas is immediately converted into radiant form. The advantages claimed for the new system—now known as the "Bonecourt"—are: (1) The combustion is greatly accelerated by the incandescent surface, and, if so desired, may be concentrated just where the heat is required; (2) the combustion is perfect with a minimum excess of air; (3) the attainment of very high temperatures is possible without the aid of elaborate regenerative devices; and (4) owing to the large amount of radiant energy developed, transmission of heat from the seat of combustion to the object to be heated is very rapid. These advantages are so uniquely combined in the new system that Professor Bone believes the resultant heating effect is, for many important purposes, not only pre-eminently economical, but also easy of control.

Diaphragm heating was then demonstrated, and the explanation was followed with the greatest interest. While the diaphragm was becoming incandescent, Professor Bone pointed out the more striking features of the phenomenon which it presented. Reference to previous lectures will supply all information in this regard. Incidentally, it was mentioned that the diaphragm method is amenable to a variety of combustible gases—coal or coke or oven gas (either undulated or admitted with water gas), natural gas, petrol air gas, and carburetted water gas, are all well suited in cases where unimpeded radiation is required. It was unnecessary for him to name the many obvious processes—domestic and industrial—to which diaphragm heating may be applied. In the domestic line, the boiling of water, grilling, toasting, and roasting are at once suggested; and although the best existing types of gas-fires are thoroughly hygienic and efficient, the lecturer thinks that the diaphragm may come in for the heating of apartments—at any rate, experiments are being tried in this direction.

One for the Electric Grill.

There has been much talk lately of the adoption of an electric grill at Romano's in the Strand. The lecturer had a tilt at the innovation. He remarked: I have recently been told of a large restaurant in London where they are grilling by means of an electric radiator fixed horizontally above the work, so that the radiant energy is directed downwards on to it. It has been claimed that the value of the recovered fat, which in the ordinary

method of grilling drips into the fire and is consumed, has more than paid for the electricity used. [Laughter.] With a diaphragm similar advantages can be secured with gas at a considerably less cost. For company gas, of a net calorific value of 500 B.Th.U. per cubic foot, at 2s. 6d. per 1000 cubic feet, with electricity at 3d. per unit, the initial cost of a given amount of energy is about fourteen times as great in the form of electricity as in the form of gas.

In the Industrial Field.

Turning to the industrial field, Professor Bone mentioned how he had had the satisfaction of visiting not long ago a large confectionery factory where the diaphragms have been employed for more than a year for the boiling and concentrating of sugar solutions. The solution is boiled in a copper pan over a 13-inch diameter circular diaphragm; the supply of the explosive mixture being controlled by one lever which operates, in a single movement, both the gas and the air cocks. Each boiler does ten to twelve heats per diem, lasting twenty minutes; and some of the diaphragms have been in continuous day use for about a year. He saw in the factory a battery of thirteen such boiling-pans, all in constant use, and was informed that the gas consumption was not more than half what it formerly used to be when the pans were heated over ordinary atmospheric flame burners. Allusion was next made to the extraordinarily rapid and efficient evaporation of liquids obtained by the use of overhead diaphragms.

Surface Combustion in a Bed of Granular Refractory Material.

The lecturer came to the second process, which is applicable to all kinds of gaseous or vaporized fuels. It essentially consists, as will be remembered, in injecting through a suitable orifice, at greater speed than the velocity of back-firing, an explosive mixture of gas (or vapour) and air in their combining proportions into a bed of incandescent granular refractory material, which is disposed around, or in proximity to, the body to be heated. The heating of crucibles, muffles, and retorts was described and illustrated. It is not necessary, he said, that the bed be disposed around the vessel or chamber to be heated; for, if contact with the burnt products is not objectionable, a shallow bed may be arranged within the heating chamber itself. Only the refractoriness of the material used determines the temperature limits. When the lecturer told his audience that, in a crucible fired by coal gas on this system, Seger cone No. 39 had been melted, which according to the latest determinations of the German Reichsanstalt melts at 1880° C. (3416° Fahr.), and also that platinum can be easily melted, they appreciated the possibilities of the method in regard to high temperatures with gas-fired furnaces. Among other interesting points hereabouts, Professor Bone said that while with coal gas, coke-oven gas, or water gas, it should be easily possible, without regeneration, to obtain, in a refractory granular bed, temperatures of up to at least 2000° C., with low-grade producer gas, such as Mond gas, about 1500° C. would probably be the approximate maximum without regeneration. But with some degree of heat recuperation, which in large furnaces is quite practicable, still higher temperatures would be attainable. The uniformity, controllability, and economy of the surface combustion method of heating was a point; and Professor Bone's own experiences of economy we heard have been confirmed in America.

Anyone who understands furnace design and construction will appreciate the many difficulties which are inevitably encountered in applying a new and revolutionary idea of this sort to the firing of large industrial furnaces. Indeed, the new conditions of heating are so radically different from the old that a new experience has to be built up. However, substantial progress has been made in the direction of gas-fired crucible furnaces for brass and aluminium melting, annealing, and forging. Some large annealing furnaces are now running satisfactorily in industrial establishments on both town gas and Mond gas; and Professor Bone understands that brass-melting can be carried out in 50 lb. and 60 lb. charges in tilting crucible furnaces, with the remarkably low consumption of about 1·75 cubic feet of gas per pound of metal melted and poured.

Surface Combustion in Steam-Raising.

There followed a description of the application of surface combustion to steam raising in multitubular boilers, with which investigations have so far been principally made. A prominent blast-furnace engineer estimates that the thermal efficiency of the best type of water-tube boiler fired by blast-furnace gas does not exceed about 55 per cent.; while in the case of boilers fired with coke-oven gas, the average thermal efficiency probably does not exceed 65 to 70 per cent. On applying the principle of surface combustion to the gas firing of multitubular boilers, results have been obtained with coal gas corresponding to the transmission of nearly 95 per cent. of the actual calorific value of the gas to the water in the boiler. We were next introduced to the experimental tube fitted with an open trough in which the first steam-raising experiments were obtained. The satisfactory results realized soon led to the construction of an experimental boiler. The combination of the steam-boiler with a feed-water heater proved phenomenally successful. Passing over the tests made by Professor Bone and his associates, it may be mentioned that their own remarkable results were eclipsed in an independent trial carried out by German engineers in London on Jan. 8 last year, when, with coal gas of a net calorific value of 510 B.Th.U. per cubic foot, at N.T.P., and evaporating at the enormously high rate of 33·9 lbs. from and at 212° Fahr. per square foot of heating surface, the ratio of the heat utilized to the net heat developed by combustion was 0·933 : 1.

The 110-tube boiler at the Skinningrove Iron-Works was next described. It was started in November, 1911. At the end of July, 1912, after altogether five months' running, tests were made of the boiler by an American engineer, which showed that with a total evaporation of 5000 lbs. of water "from and at 212° Fahr." per hour the ratio of heat utilized to the net heat supplied was equal to 0·927 : 1. After the five months' working of the boiler, it was also found by the same engineer (one of the tubes was cut out for the purpose of testing it) that the mechanical properties of the tubes had not been in any way impaired. Perhaps the best testimonial to the success of the initial installation of a large boiler on the new principle is the fact that the Skinningrove Iron Company have put down a second unit for their new battery of coke-ovens, which is now being started up; and it is expected that within the next few weeks the two boilers will be seen working side by side.

A Protest by Professor Bone.

The lecturer next mentioned that, within the last few months, the firm of Krupps have put down a boiler in connection with their coking plant in the Ruhr district of Westphalia. It has been running successfully since October, and a few weeks ago underwent its official steam trials. Pending the publication of the results in the German technical press, Professor Bone was unable to give details that night. But in an unofficial test on Oct. 30 last, an evaporation of 6750 lbs. of water per hour "from and at 212° Fahr.," with an efficiency ratio of 0·925, was realized, which results had been confirmed in the recent official tests. This reference led him to say: As this is the first occasion on which I have been able to refer in public to the successful inauguration of these inventions on a commercial scale in Germany, and in anticipation of the publication of the results of the official German trial, I wish, with your kind indulgence, to mention a matter which, although it may appear personal, is nevertheless bound up with the credit of British scientific invention. This boiler, invented and developed as it was in Leeds, by a group of British chemists, all university trained men, aided by the advice of Mr. Michael Longridge, and by the enterprise of my friends of the Skinningrove Iron Company, may truly be claimed as an all-British invention, if ever there was one. Nevertheless, it has recently been described in the German technical press as the "Bone-Schnabel" or the "Schnabel-Bone" boiler, instead of the "Bonecourt" boiler as it should be. It may be necessary for me at some future time to deal more fully with this aspect of the matter; but to-night I will content myself with a protest against any thought to claim or represent this boiler as in part a German invention.

The lecturer thought he had said enough about the boiler to convince those who had heard him that it combines a high thermal efficiency and concentration of power in a unique degree. He then summarized its advantages—mentioning, among other points, that, under normal working conditions, there is obtained a mean evaporation of 20 lbs. per square foot of heating surface per hour. This, if need be, can be forced up to 35 lbs. Of this total evaporation, 70 per cent. occurs over the first one-third part of the tube, 22 per cent. over the second one-third part, and only 8 per cent. over the last one-third. Each tube of the boiler is an independent combustion unit, capable of being shut off or lit up without affecting the others; and as it takes only five minutes, after lighting up a cold tube, to attain its maximum steam output, it is obvious that not only is such a boiler highly responsive to rapid variations of load, but it also works with equal efficiency at both small and big loads—indeed, within very wide limits, its efficiency is practically independent of the load.

More Work to be Done.

In conclusion, the lecturer said that there are still obscure points concerning the mechanism of surface combustion for future investigation, and it will probably take many years to realize the wide range of industrial possibilities in gas-firing already opened up, not to speak of the equally important problem of oil-firing. He hoped he had succeeded in convincing those present that a sound foundation has been laid upon which may be reared an enduring edifice.

Year Book for Inventors and Patentees.—We have received from the Dexter Press, Limited, 3, Brown Street, Market Street, Manchester, a copy of the "Inventors' and Patentees' Year Book for 1914." It is by Mr. William H. Taylor, a specialist of many years' experience in patent, design, and trade-mark registration at home and abroad, and formerly editor of various technical journals; and he states in his preface that it is "the first year book ever issued in the interests of inventors and patentees." It represents an attempt to give in simple language a comprehensive review of all the salient points in British patent law and practice, and the procedure followed in the application for, and the granting of, patents. Particulars connected with the protection of inventions in every patent-issuing country throughout the world will be found in the book, together with facts and figures gleaned from official records, so far as they were available to the author. The text occupies 740 pages, and it is followed by an index. The price of the book is 7s. 6d. net.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Sixth Annual Dinner.

On Saturday evening, at the Cannon Street Hotel, there was held the sixth annual dinner of the London and Southern District Junior Gas Association; and the only respect in which any but laudatory remarks can be made about it is the somewhat meagre extent to which the members lent the support of their presence to the function. This must have proved a little disappointing to the Stewards (Messrs. D. J. Winslow and J. Hewett), who had made the best possible arrangements for the evening, and to those who contributed to a first-class musical programme. However, though the party was not as large as could have been wished, it was warmly appreciative of the good fare provided for both body and mind; and a thoroughly enjoyable evening was spent. Among the members of the Association there is much musical talent; and Saturday's proceedings showed that it is not confined to them, but that the members of their families are similarly gifted. Mrs. D. J. Winslow repeated her kindness of last year by singing; Miss Mabel Frost presided at the piano, and sang; and Miss Olive Worth gave violin solos. The speeches dealt largely with the matter which was raised by Mr. F. J. Bywater in the address he gave to the members of the Midland Junior Gas Association a fortnight previously; Mr. Bywater, who was present, taking the opportunity of emphasizing some of the points which he had made. Testimony to the good work of the Junior Associations was borne by Mr. A. F. Browne and Mr. E. Pilbrow, who were among the visitors. The chair was occupied by Mr. S. A. Carpenter (of the North Middlesex Gas Company), the President of the Association. The Loyal Toast having been honoured,

Mr. F. J. Bywater proposed "The Association," remarking that he belonged to two of the Junior Associations, and had many friends in each. Really he had many good friends both among the Juniors and among the Seniors; and the position of a sort of connecting-link between the two was a very pleasant one to occupy. There was not the slightest doubt that the Association was doing, and doing very well, the work it was brought into being for. From ten to fifteen years ago, there was a tremendous uplifting in every branch of all industries; and this brought into existence the Junior Associations, which had fulfilled their functions in a manner that those who had anything at all to do with their promotion must be exceedingly gratified to see. They would have noticed the invitation from Mr. Edward Allen, the President of the Institution of Gas Engineers, in connection with a paper to be read by a junior at the meeting next June. This was a very graceful compliment. Some six or seven years ago, he (Mr. Bywater), as a junior, came up to London to read a paper before the Institution of Gas Engineers; and so far as he was aware, he did not know any member of the Council at that time. He was, however, treated with the utmost cordiality, and at once put at his ease. Mr. W. Doig Gibb (who was now his Chief, and from whom he had received many kindnesses) was then President of the Institution, and was the first to thank him for the paper; and from that time onward he had had the utmost consideration from the leaders of the industry. He felt sure that whoever went to read a paper this year as the result of Mr. Allen's invitation would be received most cordially. There was no need to be afraid of criticism, because any that was offered would be offered with the utmost kindness.

Education of the Junior Members.

Perhaps he might be allowed to mention a subject which he had had an opportunity of bringing to the notice of the Midland Junior Gas Association a fortnight before. This was the education of the junior members of the industry. He then touched upon a matter which he felt there was urgent need should be taken up. From information which had since come to him, and from the reception accorded to his address by the Technical Press (which he took this opportunity of acknowledging with great gratitude) it appeared he had really brought forward a subject with regard to which everybody felt that something must be done. If some scheme could be set going, whereby a young man who had brains and the ambition to get on, would have a definite object in view to work for, it would be of great benefit to the industry. It was really only human to be more or less lazy in the evening; and unless a young man had something to fire his ambition, he was hardly likely to work four or five nights every week. He needed something definite—some aim which someone in a responsible position told him was necessary. If he was assured that a certain course would give him a greater chance of getting on in life, he would take this course; but if he was only given a general impression that he might do this, that, or the other, he would do very little. There were any amount of opportunities for getting over one's early years without much to show for it; but if they could only give a young fellow something definite to work for, he would do it. If a man equipped himself well, he was going the most certain way to win success. It was his belief that if a man was worth money, he generally got it; but he had to show his worth before he got it. A lucky man might be able to get into a comfortable corner without being well equipped; but the opportunities of doing this were certain to be less in the future than they were to-day. A man who was worth a good salary and well equipped stood a better chance of getting it than one who was not. Mr. Edward Allen had stated in a letter in the last issue of the "Journal" that quite recently inquiries were made for a man to fill an important position, but none of the candidates were able to satisfy the requirements. This was a sad state of affairs. He believed there were several appointments going now, for which the right type of man was being sought. It could not be too much brought to the notice of the juniors that there were openings for them, if their opportunities for training and education were made the most of, and they really devoted their energies to thoroughly equipping themselves. A guiding hand was wanted; and it would be well if the Junior Associations could give concrete form to some scheme.

Mr. S. B. Chandler, in response, said it was cause for gratification that they should have gentlemen of Mr. Bywater's standing coming and testifying to the work of the Association in the way he had done that evening. What he had said augured well for the future of the Junior Associations generally. Mr. Bywater had spoken much about the education of the young professional man; and certainly this was a subject with regard to which the Association should bestir itself. During the present session there had been series of lectures by Dr. Lessing and Mr. Tooth, which had been much appreciated by the members; and it was hoped to arrange for other lectures next session. One point he would like to bring out was that the membership of their Association at the present time stood at 200; and this had struck him as being a very small proportion, when they considered the number of young men who were engaged in London alone in the gas industry. In some companies there were fifty or sixty men who were eligible for membership. The seniors were always ready to help them; indeed, the junior to-day had every encouragement to get on. It was the Council's desire that the education question should be taken up; and he hoped the London Association might formulate some scheme, perhaps on the lines Mr. Bywater had hinted at in the course of his Birmingham address.

The toast of "Our Patrons and Visitors," was in the hands of Mr. J. Hewett, the Senior Vice-President, who remarked on their good fortune in having in the list of patrons such a number of men who were prominent in the gas profession. On many occasions they had been indebted to them for their support and advice.

The Work of the Junior Associations.

Mr. A. F. Browne, in reply, said it was always a pleasure to help an Association at once so successful and so deserving; and he would follow its future with unabated interest. The Junior Associations had received from the outset every sympathy and encouragement from the leaders of the industry. This Association from its earliest days had the support of the late Sir George Livesey, and of him who was to-day Sir Corbet Woodall; and other names of which they might well be proud had from time to time been added to the list. From these gentlemen they had received, in addition to sympathy and support, advice and instruction at their meetings, which had been invaluable. In this way they had been the recipients of great good fortune; but this was because they had thoroughly deserved it. The same remark applied to the other Junior Associations, because if ever there had been a movement in connection with the gas industry which had merited success it was the Junior Association movement. This success had been astonishing. It was only necessary to refer to the columns of the Technical Press to find what an immense amount of good work had been done. The Junior Associations were a power in the industry. This power was already recognized; and he felt confident the time was at hand when it would be fully acknowledged. The invitation from Mr. Allen, to which reference had been made, must be highly gratifying to them. This was a step which he felt sure would be attended by the greatest success. In conclusion, he would say to them, "Go on and prosper."

Mr. E. Pilbrow, whose name was also coupled with the toast, having acknowledged the compliment in humorous vein,

Mr. D. J. Winslow proposed "The President," and pointed out that the present session had been the most strenuous one in the history of the Association. Mr. Carpenter had given them a practical address on salesmanship, which was a most important branch of the industry.

In acknowledgment, Mr. Carpenter said "Strenuousness" was the watchword of the Association. At the recent dinner in Birmingham, Mr. Bywater had placed his finger on a very weak spot—the question of education. But he had done more than this. He had not only pointed out the difficulty, but had indicated the means by which the evil could be remedied. He had suggested that the Joint Council should take the matter in hand, prepare something like a definite scheme, and submit it to the Institution. Mr. Allen showed in the last issue of the "Journal" that he was quite in sympathy with this.

Other toasts were "The Secretary and Treasurer," proposed by Mr. W. E. Brown, and responded to by Messrs. Ernest Scears and E. G. Stewart; and "The Press," which was in the hands of Mr. F. A. Frost. Before the party broke up, a hearty vote of thanks was, on the proposition of Mr. F. Pearce, passed to the Stewards and artistes.

The Engineers' Year-Book.

Everyone has experienced the fact that books treating of technical matters soon get out of date. The idea therefore of publishing annually a complete encyclopædia of engineering, and engaging a staff of experts to deal each with his special subject, is one which should appeal to all engineers. Kempe's Engineers' Year-Book contains matter of interest to all classes of engineers, and to none more than those connected with gas-works, who have to deal with such a varied number of engineering problems. The 1770 pages of the book are full of formulæ and notes, not only upon gas engineering—which, by the way, is treated upon by Mr. Henry O'Connor, with articles by Professor Vivian B. Lewes and Mr. Scott-Snell—but upon every branch of engineering practice. The original plan of the work has been consistently followed—viz., to include only such modern formulæ, rules, tables, and data as are required from day to day by engineers of every class in the practical work of their calling. The price of the book (15s.) is very low, considering the amount of matter and information contained in it. This is the twenty-first issue, and new sections have been introduced treating of: Machine tools, workshop practices, cranes, bearings, and power transmission; coal and general mining; rainfall, irrigation, bridges, struts, columns, and piles; link motions and valve gear; the arrangement and construction of engineering workshops; springs; and the cost of engineering works. In addition, every important section has had expert revision and, in many cases, large extension.

PRESIDENTIAL ADDRESS TO THE MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

By J. G. Newbigging, M.Inst.C.E., Engineer of the Manchester Corporation Gas Department.

Gentlemen,—I have to thank you for the honour you have conferred upon me in electing me your President; and I look forward with pleasure to the duty of presiding over your deliberations during the ensuing twelve months, knowing that I can rely on the hearty support of the Council, and that of every member, in carrying out the duties of the office.

In addressing you to-day, I propose to deal mainly with questions of practical importance which are more or less familiar to all of you; but if in my treatment of them I awaken a new train of thought, I shall feel well repaid for the time spent in the preparation of this address.

The past twelvemonth has been a red-letter year in the annals of the gas industry. The consummation of the Jubilee of the Institution of Gas Engineers, which was celebrated last June with such marked success, and the holding of the National Gas Congress and Exhibition in October last, are signs of its vitality, and demonstrative of the desire on the part of directors, committees, and officials, to leave no stone unturned to render the industry of even greater service to the community in the future than it has been in the past years of its existence.

We are pleased that the annual meeting of the Institution of Gas Engineers is to be held in Liverpool next June, under the presidency of our esteemed member Mr. Edward Allen; and it is needless for me to assure him that he can rely upon the hearty support of his fellow members of this Institution on that occasion. I wish to remind you that it is 29 years since the annual meeting of the Institution was held in Lancashire—namely, in Manchester in 1885. It was then the British Association of Gas Managers—the same in substance if not in name; and we in the North are naturally jealous that any meetings held here are successful in every way, and that they leave pleasant recollections in the minds of those taking part in them, as well as advancing the interests of the gas industry.

It is a matter of satisfaction to find that the membership of our own District Institution is increasing; the number on the register now being 201—the largest of any of the District Associations in the United Kingdom, except the North British Association of Gas Managers.

We are proud to know that the Manchester Institution has been to the forefront in initiating schemes and reforms which have been, and will be still more so, of inestimable value to the prosperity and usefulness of our industry. The Commercial Associations, which have since matured into the British Commercial Gas Association, and the movement in the direction of the better education of gas-fitters—two sections of our work much neglected in the past, and in which we have to make up a great deal of leeway—owe their origin to members of this Institution. We are under a debt of gratitude to those of our members who have so ungrudgingly, and with such untiring energy, devoted themselves to these important works.

In speaking of the British Commercial Gas Association, I venture to make an appeal to those gas undertakings, whether under municipal or private control, who have not yet seen their way to contribute to the funds, to enrol themselves as members. We all realize that more can be done to further our interests by combined rather than individual effort. No one can scrutinize the last two years' work of the Association without recognizing that its management, and the good it has accomplished in many directions, is a pattern to all such Associations. It must be remembered that its mission is educative in the highest degree, instilling into the minds of directors and committees having supreme control of gas undertakings, the necessity of adopting commercial methods in conducting their business if the maximum of success is to be attained, and bringing before the public the many uses to which gas can be successfully and economically applied. There is one thing, however, to be guarded against in the interests of the gas industry, and that is that the technical man should not be ousted from his position by the commercial "drummer," but that both should loyally co-operate for the benefit of the undertaking they serve.

CARBONIZATION.

In considering the manufacturing side of our respective undertakings, the subject of carbonization is uppermost in our minds, and naturally so, as it is the fundamental basis of this section of our work.

The importance of a right selection of carbonizing plant and its efficient working cannot be overestimated, as on this depends almost entirely the cost of gas into the holder, and largely the price at which it can be supplied to the consumer. The great improvements which have been made in recent years in our carbonizing methods are remarkable, and will, as they supplant the older methods, materially strengthen our position as purveyors of light, heat, and power. Horizontal retorts with separate drawing and charging machines on each side of the retort-bench, and inclined retorts, have done good service in the past. By their use in Manchester during the year ended March, 1913, we were able to put gas into the holder at two of our works at a cost of 4·22d. per 1000 cubic feet sold with inclines, and 4·83d. with horizontals. The cost of 4·22d. per 1000 cubic feet of gas sold with the inclined retorts at Gaythorn is, so far as I have been able to discover from published analyses, the lowest cost which has ever been reached with either horizontal or inclined retort systems of carbonizing.

The two systems named, however, are now out of date in comparison with the single machine performing the operations of charging and discharging horizontal retorts from one side of the retort-bench, and vertical retorts, either continuous or intermittent in their working. I do not class chamber oven carbonization, with charges of several tons in weight, as one of the systems generally suitable for the production of town's gas. There may be exceptional cases where there is a good market for metallurgical coke, which is sufficient justification for their adoption; but even then the nuisance from smoke occasioned in the charging of the retorts under existing methods of manipulation is such that the system would not be tolerated in most towns.

The fascinating principle of carbonizing coal in continuous working vertical retorts early attracted my attention; and after nearly four years' practical experience of their working, I have no hesitation in expressing the opinion that it shows marked advantages over any intermittent system. This conclusion has not been arrived at without having carefully investigated all the best systems of carbonizing coal in this country and on the Continent. The ease with which it is possible to obtain the maximum yield of gas, coke, tar, and ammoniacal liquor for sale from a ton of coal, regular composition, and, therefore, specific gravity of gas, with a minimum of inert constituents, and entire absence of the trouble and cost of naphthalene deposits in the distributing mains and services, are advantages which it is only necessary to experience to fully appreciate.

Freedom from smoke nuisance, and economy of labour, are no less valuable adjuncts of this method of carbonizing, among others which could be mentioned; and they go far in outweighing the extra capital cost.

WORKING RESULTS.

It will be of interest to you if I quote the results of the working of the plant during the year ended March 31, 1913, which was put down mainly for experimental purposes at our Droylsden works in the year 1910.

Coal, &c., carbonized, 9179 tons of mixed quality, of which 18·07 per cent. was cannel and benzol. Gas made per ton, 13,115 cubic feet, of an illuminating power of 16·79 candles tested with the No. 2 "Metropolitan" argand burner. The gas, before enrichment with benzol, was 15 to 15¼ candles, of a calorific value of 560 to 570 B.Th.U. gross. The dry coke sold was 9·42 cwt. per ton of coal, exclusive of that used for heating retorts, steam raising, and general purposes. Tar made, 14·39 gallons; ammonia water made, 31·59 gallons of 10-oz. strength. The ammonia results would have been better had it not been for the fact that we are passing as much as 640,000 cubic feet through washing plant originally laid down for a maximum make of 400,000 cubic feet per diem.

For eight months of the year half the plant or eight retorts were working, and for the remaining four months the whole installation of sixteen retorts was in use; and the expenses of carbonizing, &c., were £584 for the year, made up as follows:—

	£	s.	d.
Foremen	91	13	0
Stokers	333	10	11
Coke wheeling	33	15	7
Cleaning out mains	37	7	2
Coal and coke hopper filling	78	16	6
Scurfing retorts	9	12	4
	£584	15	6

Tables Showing Details of Carbonizing Costs.

—	For the year ending March 31, 1913.		When One Bed Only Working.		When Two Beds Working.	
	Cost Per Ton.	Cost per 1000 Cub. Ft. made.	Cost per Ton.	Cost per 1000 Cub. Ft. made.	Cost per Ton.	Cost per 1000 Cub. Ft. made.
	d.	d.	d.	d.	d.	d.
Foremen	2·39	0·18	3·11	0·234	1·56	0·121
Stokers	8·72	0·67	10·92	0·822	*5·49	0·426
Coke wheelers	0·88	0·06	coke wheeling done by stokers when one bed working		1·61	0·125
Coal and coke hopper filling	2·06	0·16	1·74	0·131	1·73	0·135
Cleaning out mains	0·98	0·07	1·41	0·106	0·62	0·049
Scurfing retorts	0·24	0·02	0·25	0·019	0·45	0·035
	15·27	1·16	17·43	1·312	11·46	0·891

Note.—* In the paper I submitted to the Institution of Gas Engineers in June, 1910, this cost was given as 4·2d. The difference arises through the figure of 5·49d. including increased wages since that time, extra pay for Sunday work, half-pay allowance to workmen during sickness, holidays, retorts off for scurfing, &c.

The power required for actuating the mechanism for discharging the coke from retorts, elevating coke to producers, and elevating

coal to overhead storage bunkers, all of which is operated with gas-engines, has cost during the year £75 13s. 5d., or 1·20d. per ton of material dealt with. The cost of general repairs to brick-work of retort-bench and retorts was during their third year of working, £57 8s. 3d., or 1·50d. per ton of coal carbonized.

These working and other costs for a comparatively small installation are reasonable, but could, of course, be much reduced with a large installation. Carbonizing results and costs of working over a period of twelve months are obviously a better criterion as to the value of a system than experimental results; but I do not pretend to claim that the figures quoted are the best that can be accomplished with continuous verticals.

The plant has quite fulfilled the expectations I had formed of it. The gas is constant in composition; the inert constituents throughout the year's working averaging 5 to 6 per cent., in striking contrast to the percentage contained in gas made from horizontal and inclined retorts, which often reach three to four times this quantity when producing the same yield of gas from a ton of coal. We have made as much as 15,000 cubic feet of gas per ton, containing only 3·36 per cent. of nitrogen; and it is doubtful whether any intermittent system could show such a result.

This low percentage of incombustibles must have an effect on the efficiency of gas used in an incandescent burner. Here we are concerned not so much with the heat units present as with the flame temperature obtainable; and it is reasonable to expect that, when using a gas with a low nitrogen content, it should be much easier to secure the maximum flame temperature than with a gas containing a large percentage of this diluent.

The question of the relation between flame temperature and luminosity in an incandescent burner is one of which very little appears to be known; only vague statements having been made on the subject. Perhaps in the near future the authorities at the Leeds University may see their way to investigate the matter, and throw some light on a subject which is at present obscure.

With all systems of carbonizing, difficulties arise at times; and continuous carbonizing in vertical retorts is no exception to the rule. With this system the two chief difficulties are the deposition of thick tar in the collecting mains, and the hanging-up of the coal in the retorts, both of which troubles can be reduced to a minimum, if not entirely obviated, by the exercise of care and skill in the working of the retorts. We found on investigation at an early period of their working that the deposit in the mains consisted of crystals of ammonium chloride mixed with the tarry mass; as much as 32 per cent. having been found in a sample of the tar taken from the collecting mains.

Some coals give more trouble than others in this respect; and analysis proves that this is caused by, and depends largely upon, the quantity of chlorides present in the coal. The flushing of the mains at regular intervals with warm ammoniacal liquor has almost entirely eliminated the trouble; the small quantity which does deposit being readily removed every few days—the outlay on this work being only £37 7s. 2d. for the twelve months, as given in the table of costs.

The tendency for the coal to hang-up in a continuously worked vertical retort is naturally more pronounced with fatty coals than with those not so rich in volatile combustible constituents. It is advisable when carbonizing coal of this character to reduce its speed through the retort, and assist it in its passage by prodding regularly through the hole provided for the purpose in the ball-valve at the top of the retort. The workmen soon find that it is much easier to give attention to the prodding of the retort than to free a bad "hang-up."

A judicious mixture of coals will overcome the tendency to hang-up, but even with a very fatty coal, no serious hanging-up will take place if proper and intelligent attention is given; and once the plant is thoroughly understood, the foreman in charge knows what to expect and can anticipate any trouble which may arise.

The proportion of sulphur compounds in the gas is generally lower from vertical retorts than from horizontals, even when the latter are dealing with heavy charges. In this connection, I came across a rather interesting experience. Prior to testing, all coals were examined for water, ash, sulphur, volatile combustible matter, and calorific value; and I found that it sometimes happened that a coal which contained a fairly high proportion of sulphur gave a low sulphur result in the purified gas.

Two samples of coal were carbonized, the tests following each other. The speed of the coal through the retorts and the temperature of distillation were in each case the same; the latter being approximately 1000° C. No. 1 coal contained 1·55 per cent. of sulphur and gave 33·78 grains of CS_2 in the purified gas; No. 2 contained 3·02 per cent. of sulphur, and gave 23·41 grains of CS_2 in the purified gas. It is evident from these results that the condition in which the sulphur exists in the original coal is the determining factor in influencing the sulphur in the purified gas, and not its total content.

I am sanguine enough to believe that large undertakings adopting continuous working vertical retorts on a considerable scale, and with normal coal and residual markets, have a reasonable prospect in some cases of balancing the cost of coal and manufacturing charges with the returns from residuals—in other words, putting the gas into the holder for nothing. The ultimate price of gas would then depend on the cost of distribution, interest, and sinking fund, or dividend charges, as the case may be, and the other charges which make up the cost of gas delivered to the consumers' meters. We should thus largely add to the small number of about eight undertakings at present delivering gas to the consumers' meters at a cost of under 1s. per 1000 cubic feet sold.

The gas undertakings with low capital accounts would then be able to sell gas at a price which would ensure the more general adoption of gaseous fuel in place of solid fuel for domestic purposes, to the advantage of the industry and the community.

While speaking favourably of continuous carbonization in vertical retorts, which my experience justifies me in doing, I admit that, under special circumstances, engineers, quite wisely for the time being, may remodel existing horizontal retort-houses at less outlay than is entailed by verticals, and adopt one or other of the excellent single machines which are now available.

CARBURETTED WATER GAS.

The great advance during the last year or two in the price of oil used in the manufacture of carburetted water gas, and the likelihood of such high price remaining more or less permanent, in view of the increasing use of oil as a fuel, places the economic question of gas undertakings distributing a mixed gas to their consumers on quite a different footing from that which existed some years ago. Furthermore, the improved methods of coal carbonizing introduced in recent years have gradually enabled coal gas to out-distance carburetted water gas in cost of production. The latter is therefore in the position of having to fight for its existence against a two-edged weapon in the shape of dear oil on the one hand, and improved coal carbonizing on the other; and I cannot conceive that any gas undertaking, in this country at any rate, can lightly embark on expenditure in the installation of plant for the manufacture of this gas unless under very special circumstances.

In saying this, I do not wish to detract from the valuable part which carburetted water gas has played in the past with those undertakings where it has been used as an enricher since its introduction into this country about twenty years ago. But the lowering of the illuminating power standard has deprived it of any claim it may have had to this sphere of usefulness.

The question of carburetted water gas regulating the coke market is one which must not be lost sight of; but how far the placing on the market of the whole of the coke used for its manufacture will affect the selling price—assuming that the manufacture of this gas was entirely suspended—it is difficult to say. This extra coke, including that now used for the manufacture of carburetted water gas, together with that which would be made through the extra production of coal gas, would amount in the United Kingdom to about 1,600,000 tons, or 5 cwt. per gas consumer. Surely we have not exhausted our capabilities of finding new outlets for this additional quantity? The extra coke might be termed by some as over-production; but this is often a misnomer—over-production frequently being synonymous with faulty distribution.

At the time of its introduction, much was said of other collateral advantages accruing to undertakings manufacturing this gas; but time will not permit me to examine these in detail.

One particular advantage I should like to refer to, and that is the availability of the plant at very short notice; the proportion of carburetted water gas to coal gas being increased at will, and so proving valuable in case of fog or other causes of shortness of supply. This flexibility of the plant, while having advantages in one direction, presents serious disadvantages in another. We all recognize the importance—nay, the absolute necessity—of maintaining a supply of gas to our consumers unvarying in composition, and consequently in specific gravity, within the closest possible limits, so that the burners used for its consumption can be standardized; thus obviating the necessity for the consumers regulating the gas and air supplies to their burners—a proceeding which is objectionable to them and detrimental to the gas industry. This standardizing of burners is almost an impossibility with undertakings using two gases in varying proportions from time to time, differing to the extent of 20 per cent. in specific gravity.

I see nothing to alter the view I have formed that the manufacture of carburetted water gas will eventually be discarded, except for purely stand-by purposes. The change will necessarily be very gradual, because the undertakings possessing plants on an extensive scale will have to utilize them continuously until such time as the additional coal-gas plant is installed equal in productive capacity to the carburetted water-gas plant displaced.

I give the figures of the comparative cost of manufacturing coal gas and carburetted water gas in Manchester for the year ended March 31, 1913, which could without doubt be confirmed by many others manufacturing this gas. [See table, next page.]

RESIDUALS.

The importance of gas undertakings securing the utmost return from the residuals cannot, of course, be over-estimated; and it is gratifying that the British Commercial Gas Association have initiated a Coke Sales Committee to inquire into the better disposal of this, our most important residual, the revenue from which so largely influences the net cost of coal. The work of this Committee, combined with that of the District Commercial Associations, which have done so much good work in disseminating information among their members for some years, will, we hope, result in putting the method of disposing of this residual on a more satisfactory basis.

The past twelve months has been a trying time for most gas undertakings; high-priced coal and a declining coke market preventing much needed reductions in the price of gas. When we

Comparative Statement of Costs of Manufacture of Coal Gas and Carburetted Water Gas for the Year ended 31st March, 1913.

Coal Gas, 4,788 969,000 Cubic Feet.			Carburetted Water Gas, 1,155,869,000 Cubic Feet.		
—	Amount.	Per 1000 Cubic Feet Made.	—	Amount.	Per 1000 Cubic Feet Made.
	£	s. d.		£	s. d.
Cannel and coal.—402,287 tons at 12s. 1·47d.	243,841	1 0·22	Oil.—2,380,263 gallons at 2·01d. per gallon	19,928	4·14
Oil (spirit).—14,959 gallons at 11·15d.	695	0·03	Coke.—25,053 tons at 13s. 1·50d. per ton	16,441	3·41
			Wages handling coke at 4·49d. per ton	469	·10
			Water for generators only, 8,870,000 gallons at 4·85d. per 1000 gallons.	179	·04
	244,536	1 0·25		37,017	7·69
Less residuals	235,818	11·81	Less residuals	3,121	·65
Net cost of material	8,718	0·44	Net cost of material	33,896	7·04
Working expenses—			Working expenses—		
Carbonization (wages)	37,652	1·89	Generation (wages)	3,016	·63
Purification. Credit.	*2,392*	*0·12*	Purification	850	·18
Retorts	5,974	0·30	Repairs and maintenance	2,279	·47
Repairs and maintenance	18,996	0·95	Sundry charges	1,537	·32
Sundry charges	27,585	1·38	Salaries	1,139	·24
Salaries	6,590	0·33			
Cost into holder	103,123	5·17	Cost into holder	42,717	8·88
Capital charges—			Capital charges—		
Interest apportioned	20,293	1·02	Interest apportioned	2,202	·46
Sinking fund (actual provision for renewals, based on life of plant adopted in lieu thereof)	19,728	0·98	Sinking fund (actual provision for renewals, based on life of plant adopted in lieu thereof)	2,233	·46
Total cost	£143,144	7·17	Total cost	£47,152	9·80
(Exclusive of chief rents, rates, and taxes)	Equivalent to 6·57d. per 1000 cubic feet 16 candle power gas.		(Exclusive of chief rents, rates, and taxes)	Equivalent to 9·57d. per 1000 cubic feet 16 candle power gas.	

On the calorific basis, the respective costs are: Coal gas, 6·57d. per 1000 cubic feet made; carburetted water gas, 10·52d.

NOTE:—Capital charges for gasholders are all debited to coal gas.

consider the importance of tar, ammoniacal liquor, and spent oxide, as the basis of commodities of such vital necessity to the industries of the country, and coke as a valuable smokeless fuel, we should not rest satisfied until we receive fair value for them; and if we do this, there should be no difficulty in at least paying the whole of the coal account from the revenue received from these residuals, as indeed a few undertakings already regularly succeed in doing.

In many cases the low return from coke can be traced to the absence of commercial knowledge and enterprise in dealing with its sale. It is not sufficient to say that the laws of supply and demand—powerful as they are—will, unaided, secure the best results in the sale of coke, or, indeed, that of any other gas-works residual. There is a tendency in the case of municipal undertakings not to exploit residuals on strictly commercial lines; thus depriving the undertaking of its full economic advantages. It is all very well to have regard to local considerations; but this policy should not be carried so far as to be inimical to the interests of the undertaking. I submit, then, that we should avail ourselves of all possible means to secure the full commercial value of the whole of our products.

With all large undertakings, and even those of moderate size, it is essential that the sale of coke should be promoted by employing a competent official for the purpose, who should have a reasonably free hand in its disposal. It is also necessary that it should be suitably prepared for various markets. In fact, I look to the time when no coke will be sold in what may be termed its crude state as it comes from the retort-house, but that it will all be broken into different sizes, freed from deleterious matter, and, for some uses, washed. In Manchester, we now dispose of about 20,000 tons of broken coke per annum, at a charge of 2s. 6d. per ton beyond the yard price of ordinary coke—a figure I consider much below its actual value. But if the result is the establishing of a permanent market, it is worth while making a temporary sacrifice of profit. The demand for broken coke is, with us, a continually increasing one.

We are often charged by advocates of smokeless fuel that we do not produce a coke containing (say) 12 per cent. of volatile combustibles; and ingenious, but unsuccessful, attempts have been made to show how profitable a proceeding this would be. But we know perfectly well that this would not be the case; the more profitable method of working being to extract from the coal all the constituents possible. I have sometimes thought that a genius may one day appear and show us how to impregnate coke under pressure, at a low cost, with some suitable substance which would give it equal inflammability to coal, in which case a fortune would be the reward of the inventor, and financial gain to gas undertakings. The structure of coke lends itself admirably to some treatment of this kind. Without more stringent domestic smoke laws to assist, there is not much prospect of the more general adoption of coke for domestic purposes with its present volatile content averaging about 1½ to 2 per cent., as against coal with twenty times this quantity.

It is questionable if it is the best policy to convert all the ammonia produced in gas-works into sulphate, and whether a portion should not be converted into other ammonia products, such as ammonium chloride and liquid ammonia. It has been proved that a considerably increased revenue can well be obtained for the latter product by cultivating a local sale for household purposes.

The distillation of tar is a business into which none but the larger undertakings can enter with any hope of success of increasing their revenue from this product. Even in their case it is questionable whether a greater return can be obtained than by the method of selling the crude tar on the sliding-scale of monthly market values, with a valuer of experience who will see that the fair market price is secured.

We have been particularly fortunate in Manchester in disposing of our spent oxide to great advantage, on a separate scale for sulphur and "Prussian blue," with the result than on our purification account, for both coal gas and carburetted water gas, after paying for all materials and labour, we showed a profit last year of £1542. Unfortunately such an outlet for this product does not present itself to every gas undertaking.

CONSERVATION OF AMMONIA.

For the past two years, special investigation has been made at our Bradford Road works in the conservation of the ammonia produced during carbonization, and retaining the same in the form of ammoniacal liquor. The results have fully justified the time and labour expended; the following comparisons giving the increased yields obtained:—

Gallons per Ton of Coal Carbonized.

	10-oz. Ammoniacal Liquor.
Average of five years previous to experiments	29·84 gallons.
Average for past twelve months	32·42 ,,
Increase	2·58 ,,
Per cent. of increase	8·60 per cent.

It had been our custom to adopt the usual practice of feeding the hydraulic main, for the purpose of flushing, &c., with ammoniacal liquor from an overhead tank, and to use the Livesey washers to concentrate the general well liquor.

First, a series of analyses were made of the ammoniacal liquor as it entered the hydraulic main, and of the liquor after it had been in the main for 24 and for 48 hours respectively, and prior to flushing out, with the following results:—

Average of Five Tests.

—	Grains per Gallon.				
	Free.	Fixed.	Total.		
	NH_3.	NH_3.	NH_3.	CO_2.	H_2S.
Well liquor used for feeding hydraulic main	1044	392	1436	1138	227
Liquor in hydraulic main after 24 hours	166	883	1049	71	17
Liquor in hydraulic main after 48 hours	104	1251	1355	25	10

The striking difference in the percentage of the free and fixed ammonia entering and leaving the hydraulic main led us to examine the gases leaving the condensers and entering the Livesey washers, when it was found that during and immediately following the periods of flushing the mains, there was a marked increase in the gas content of CO_2, H_2S, and NH_3, due to the hydraulic main acting as a free ammonia still.

Chart I. gives the results obtained from 6 a.m. to 5 p.m.

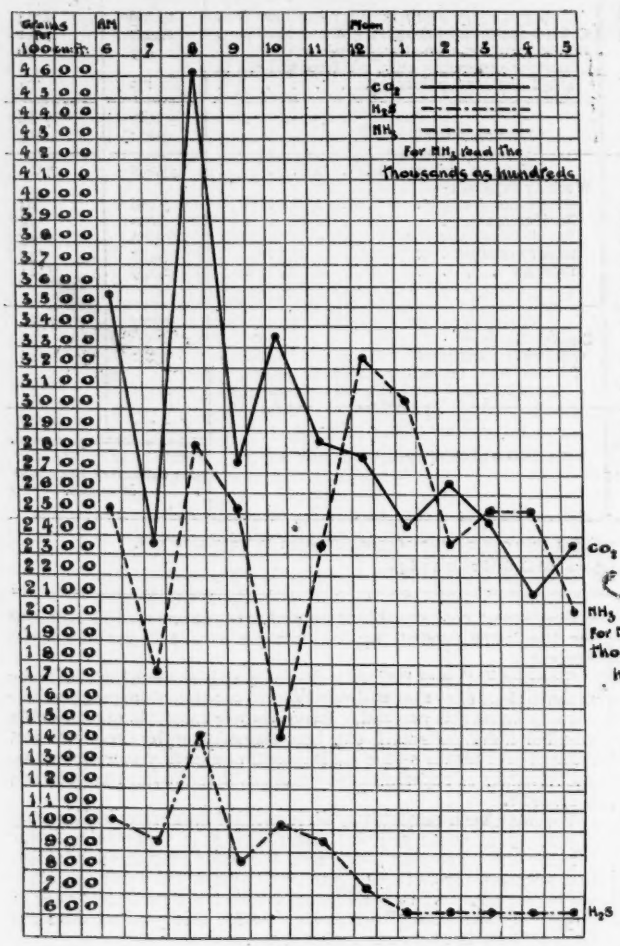


Chart I.—Inlet to Washers. Ammoniacal Liquor Feed to Hydraulic Main.

Two deductions were made from this series of analyses.

1.—The ammoniacal liquor, constantly overflowing the weir-valves, was in such a state that free ammonia was being given off in large quantities, and therefore any unavoidable exposure to either an air current in the pipe-line or to the atmosphere meant a probable source of serious loss.

2.—During and immediately following the periods of flushing the mains, the work put on the washers and scrubbers was greatly increased, militating against their regular working.

To overcome these two drawbacks, water was used for flushing the mains, and the experiments repeated.

Average of Five Tests.

—	Grains per Gallon.				
	Free.	Fixed.	Total.		
	NH_3.	NH_3.	NH_3.	CO_2.	H_2S.
Water used for feeding hydraulic main.	..	..	..	..	..
Liquor in hydraulic main after 24 hours	125	625	750	62	25
Liquor in hydraulic main after 48 hours	131	976	1107	45	16

Chart II. Gives the grains of CO_2, H_2S, and NH_3 per 100 cubic feet entering the Livesey washer.

A comparison of the two methods of working shows the following advantages in favour of a water-feed for hydraulic mains:—

1. The more constant composition of the gas entering the washing plant.
2. A lower percentage of free ammonia in the liquor overflowing the weir-valves during and immediately following the periods of flushing.

To further eliminate the losses due to pumping, &c., the liquor leaving the scrubbers, which are fed with clean water, is passed direct by gravity into the Livesey washers and then on to the well. The only pumping required is when the liquor is sent to our bye-products works for the manufacture of ammonium sulphate.

Every collecting pot, tank, and well has been carefully fitted with an efficient cover, and the gases in the large underground wells are analyzed at frequent intervals for combustible gases by means of Haldane's gas apparatus as used in mines.

DISTRIBUTION AND MANAGEMENT COSTS.

The main factor in bringing about the more general use of gas for cooking, heating, and industrial purposes is obviously that of price. Improved carbonizing methods and careful management in other directions in gas-works have resulted in some very great savings in manufacturing costs during recent years; but it is incumbent upon us to see that everything in reason is done to bring distribution and management costs to the lowest possible figure, without, of course, impairing efficiency.

The remarkable increase in the number of automatic meters, cookers, and gas-fires brought into use during the last decade has naturally caused a very considerable change in the proportion that distribution and management charges now bear to the whole of the costs. In the case of Manchester, it is about 50 per cent. In these are included all costs from the holder to the consumers'

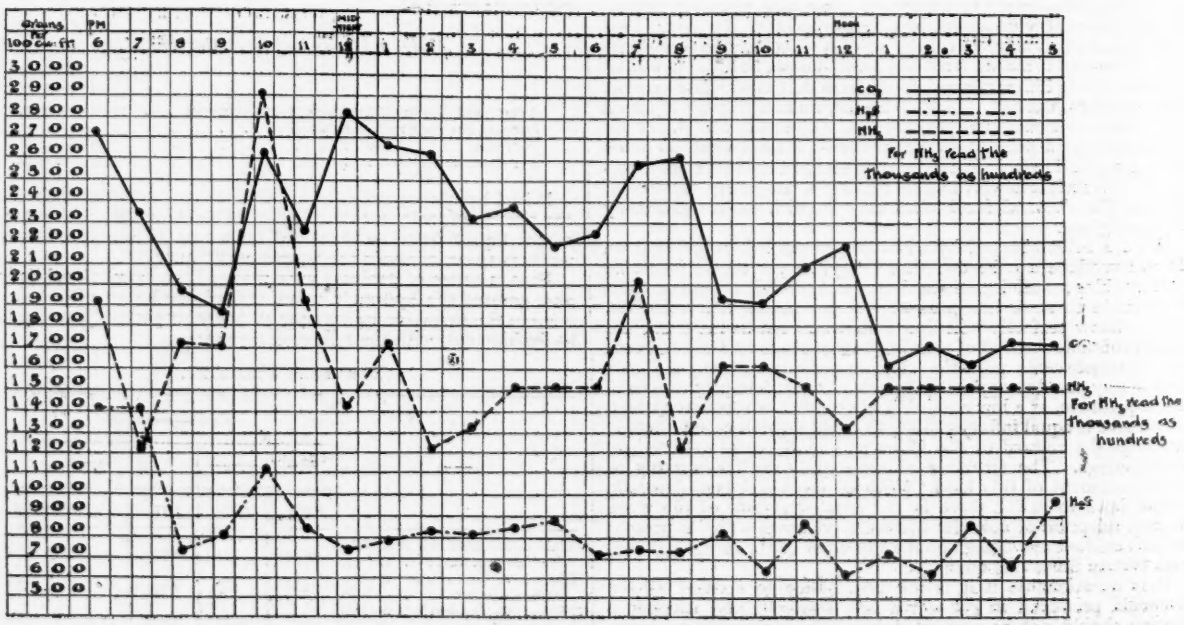


Chart II.—Inlet to Washers. Water-Feed to Hydraulic Main.

meters, and from the reading of the meters to the actual banking of the cash. This, it must be admitted, is a most important sphere of control, and one that calls for efficient management. In its absence, the great economies effected by the improved scientific methods now adopted in the manufacture of gas are very soon entirely neutralized.

In the first place, the leakage from mains and service pipes is a matter which tells considerably in distribution costs. It is, to say the least, a most unsatisfactory state of affairs which permits the avoidable waste of any commodity, the production of which has entailed so much labour and expense; and it should be the chief concern of the engineer to see that this is not due to bad workmanship in the laying of mains and service pipes.

The next point is that of the number of consumers in relation to the length of mains. The laying of mains is costly work. We should therefore make every effort to bring about their profitable use when they are laid; each additional consumer, of course, reducing the burden of distribution cost. When these are secured, no pains should be spared to raise the consumption to the highest possible point by inducing consumers to take advantage of the excellent appliances so much appreciated by those who already have them; a high consumption per consumer, being, of course, one of the most telling influences in lowering relative cost. In order to encourage this, it is essential that, as far as possible, all cookers, gas-fires, and other appliances should be provided free of charge.

SUPPLYING CONSUMERS' APPLIANCES.

In this connection, it will be of interest if I give you our experience of providing cookers free of all charges for fixing and hire in Manchester. The Gas Committee commenced to hire out gas-cookers in 1885; and the charge for hire and fixing was abolished in June, 1903, because it was found that their use was not increasing as quickly as was desired. The number on hire for the year 1901 was 12,085; 1902, 12,930; and 1903, 12,807—showing that the demand was stagnant. The first suggestion to increase their use was a reduction in the price of gas used for cooking purposes. But this idea was soon discarded, because it would have involved additional meter and inspection costs. The abolition of the hireage charge at once began to be felt. The number of cookers now in use is 65,731, with an annual gas consumption of 798,000,000 cubic feet; and the demand is continually increasing. We only commenced to hire-out gas-fires in 1911. These are supplied in standard makes of three sizes on simple hire at charges of 1s., 1s. 6d., and 1s. 9d. per quarter, which includes fixing free and periodical inspection and maintenance—the latter an essential for their success. Special fires are let out on the hire-purchase system.

Up to November last, 10,104 had been fixed, which are used in the consumers' premises as follows: In offices, 1210; in workshops, 195; in bedrooms, 3190; and in other rooms, 5509.

I see no reason why gas-fires should not be let out free of hire charges in rooms where there would be a prospect of their being used regularly.

On the general question of gaseous heating, I am strongly of opinion that while the pillar fire gives the highest efficiency for a given consumption of gas, and is the best for intermittent use, a fire laid in the ordinary grate to imitate a coal-fire—of which there are some well-known examples—will be found to be the one demanded for rooms where heat is continuously required, in spite of the fact that this type of fire entails a greater consumption of gas than the pillar fire to give equal efficiency. A low price of gas is therefore of importance in spreading the use of gaseous heating, because it is on economic grounds alone that its universal use in place of solid fuel will have to be justified.

The policy of fixing a price for gas covering all charges for gas, and the use of meters, cookers, and other appliances, as far as possible, is in my opinion a sound one. Any initial outlay required from a consumer, or even a constantly recurring charge for hire of appliances, is unquestionably a deterrent to new business. The system, however, calls for vigilance on the part of the management, in order to make sure that the appliances are being used to an extent to justify their being provided free; otherwise considerable loss will be the result.

RENDERING AND COLLECTING ACCOUNTS.

One of the most important elements in distribution and management costs is that of reading the meters and the rendering and collecting of the accounts. This work is unnecessarily laboured and costly. The methods adopted should be as simple and direct as it is possible to make them, if the cost is to be kept low. It is not a question of cutting down salaries, but possibly of increasing them, though ultimately there will be fewer recipients. It is essentially a matter of skilful organization. The time is not remote when the meter reader will not only read the index of the meter, but will at the same visit make out the account and hand it to the consumer, it having been previously prepared at the office as far as possible.

The existing method of dealing with automatic consumers' accounts does not widely differ from those roughly outlined as to ordinary accounts, excepting that the readings are taken every four or six weeks, instead of quarterly. The consumption has to be ascertained and charged, the cash collected, and a receipt given, all of which involves as much work for the one visit as that suggested for the ordinary or credit consumer. The present system for credit consumers has been so long in force, and so accustomed are we to regarding it as final, that I fear our minds are not sufficiently open to new ideas in the direction of simplifying matters. I feel sure, however, that the whole question calls for the most careful consideration.

With regard to the collection of accounts, the discount system is now very generally adopted, and the results, without exception, go to prove that it is by far the most economical and effective method.

COMPETITION WITH ELECTRICITY.

I should like to refer to the question of competition with electricity, which it is impossible to ignore, and on which it is advisable we should take our bearings from time to time.

To illustrate my remarks, I submit two statements showing the progress of the gas and electricity undertakings in Manchester during the past five years. I am indebted to my friend Mr. S. L. Pearce, the Chief Electrical Engineer to the Manchester Corporation, for the figures relating to electricity.

Comparative Statement of Each Class of Consumption during Five Years ending 31st March, 1913.

Class.	1909.		1910.		1911.		1912.		1913.		Increase During the Five Years.	
	Cubic Feet in Thousands.	Per Cent. to Total.	Cubic Feet in Thousands.	Per Cent. to Total.	Cubic Feet in Thousands.	Per Cent. to Total.	Cubic Feet in Thousands.	Per Cent. to Total.	Cubic Feet in Thousands.	Per Cent. to Total	Total Increase Over 1909 Figures.	Per Cent. of Increase Over 1909 Figures.
											Thousand Cubic Feet.	
Lighting and industrial purposes	4,010,861	74·56	3,925,586	73·80	3,980,127	74·49	3,932,758	72·51	4,019,130	71·02	8,269	·20
Gas cookers	613,000	11·39	656,000	12·33	695,000	12·83	737,000	13·59	798,000	14·10	185,000	30·18
Gas fires	*Nil*		*Nil*		*Nil*		*Nil*		70,000	1·24	70,000	
Gas engines	390,637	7·26	378,642	7·12	380,934	7·03	390,235	7·20	402,863	7·12	12,226	3·13
Street lighting	365,527	6·79	359,416	6·75	359,892	6·65	363,211	6·70	369,156	6·52	3,629	·99
Total sales	5,380,025	100	5,319,644	100	5,416,013	100	5,423,204	100	5,659,149	100	279,124	5·19
Number of consumers	174,290		178,490		181,356		183,793		185,295		11,005	6·3

Class.	1909.		1910.		1911.		1912.		1913.		Increase during the Five Years.	
	Board of Trade Units.	Per Cent. to Total.	Board of Trade Units.	Per Cent. to Total.	Board of Trade Units.	Per Cent. to Total.	Board of Trade Units.	Per Cent. to Total.	Board of Trade Units.	Per Cent. to Total.	Total Increase over 1909 Figures.	Per Cent. of Increase over 1909 Figures.
Lighting	13,859,795	20·7	14,473,933	20·2	14,494,335	17·4	14,198,929	15·2	14,897,820	14·3	1,038,025	7·5
Power	23,290,227	34·8	28,412,290	39·7	40,223,985	48·3	50,091,108	53·5	59,428,860	56·9	36,138,633	155·2
Traction	29,675,249	44·3	28,526,468	39·9	28,423,527	34·1	29,216,716	31·1	29,821,405	28·6	146,156	·5
Street lighting	99,593	·2	144,696	·2	167,001	·2	176,187	·2	198,810	·2	99,217	99·6
Total sales	66,924,864	100	71,557,387	100	83,308,848	100	93,682,940	100	104,346,895	100	37,422,031	55·9
Number of consumers	8,125		8,944		10,197		11,189		12,568		4,443	54·7

Although the extent of the competition varies according to local circumstances in different towns, the position in Manchester is fairly representative of that existing in all large manufacturing towns.

An examination of the two tables reveals some interesting features and food for reflection. The increase in the output of electricity during the period under review is almost entirely for power purposes. The facility with which it can be adapted for use without the intermediary of long lines of shafting gives it a decided advantage over gas-engines and other sources of power.

In spite of this advantage of electricity, however, I am convinced that the use of gas-engines with town's gas could be stimulated by the introduction of an easy system of hire-purchase of gas-engines, which, indeed, has been adopted by some gas undertakings, coupled, of course, with a low price for gas used for power purposes.

The utilization of electricity for street lighting, although showing a large percentage increase over the five years, forms a very small proportion of the total output of electricity.

There are few important towns in the kingdom where less electricity has hitherto been used for street lighting than Manchester; and the Electricity Department claim (perhaps not without justification) that, as a joint municipal undertaking, they should have a share of this outlet for current.

The use of gas and electricity for illumination, apart from street lighting, shows an increase in the five years of 0·2 per cent. and 7·5 per cent. respectively. In the case of gas, this includes that used for industrial purposes; in the case of electricity, current used for heating, cooking, and domestic purposes, which is not a very large proportion of the whole. The increased use of gas for cooking and heating shows marked progress, and clearly indicates the direction in which the utilization of gas in the future will extend.

The total number of gas consumers in Manchester is 185,295, and of electricity consumers 12,568; and it is remarkable that during the past five years the increase alone in gas consumers has been nearly equal to the total number of electricity consumers. Of this increase of 11,005 gas consumers during the period under review, automatic consumers number 10,088. I must leave the many other interesting comparisons which can be made of the two tables submitted.

There is no getting away from the fact that practically all the new better-class houses—say, above £30 rental per annum—are being equipped with electricity for lighting; and the question is, How must this competition be met?

When making the choice of an illuminant, the comparative prices at which gas and electricity should be sold to make them equal in cost from the standard of lighting efficiency, although of the utmost importance to people with small incomes, does not weigh with those more liberally endowed with this world's goods, unless there is a very wide divergence in price.

The periodical cleaning and adjusting of an incandescent gas-burner and the renewal of a mantle, which is a necessity to keep the light in the highest state of efficiency, although a simple and inexpensive matter, is one which most consumers will not be troubled with. They invariably attribute the falling-off in the light to the usual cry of "bad gas." This neglect of burners, which, in my opinion, is responsible for the majority of complaints, is a serious problem with gas undertakings, and must be effectively tackled.

The directions in which gas undertakings can improve their position in the use of gas for lighting, although appreciated, require emphasizing from time to time. They are:

The distribution of gas absolutely regular in composition, and therefore in specific gravity, so that a standard burner can be used without air and gas adjustment. Such a burner has been adopted by the South Metropolitan Gas Company—one of the many examples in gas administration which this well-managed Company have set us from time to time.

The maintenance of a constant and minimum pressure of 3½ to 4 inches available to every consumer.

The establishment of a competent staff of highly-trained fitters to clean consumers' burners free of charge and supply mantle renewals at cost price. This attention to consumers' burners is undertaken by some gas companies and authorities. It should be universal. Those responsible for such work who do not carry it out are neglecting their duty to their consumers and their undertaking, and cannot expect anything but a gradual decline in their lighting load.

Although I have said that the question of price does not affect the better class of consumer in the choice of an illuminant, there is no doubt that the practice with some gas undertakings of giving all their reductions in price to the large consumer, and neglecting the smaller one, has led in many cases to much discontent and to the substitution of electricity for gas.

DIFFERENTIAL PRICE FOR GAS.

While generally agreeing with differential prices for gas according to consumption, I fear that some undertakings are going too far in this direction. I know of towns where the difference in price between the lowest and the highest charge is 100 per cent. Prices to large consumers have gradually been lowered, while the moderate and small consumers have not had a reduction for years, with the result, as already stated, that they adopt electricity for lighting at the first opportunity.

Generally speaking, 100 gas consumers of 20,000 cubic feet per annum are a better asset to an undertaking than one of 2,000,000 cubic feet per annum; and although the small consumers cannot expect to have their gas at precisely the same price as the larger consumer, care should be taken that there is not such an extreme disparity as to cause dissatisfaction. In the former case there is every prospect, when offering inducements in the shape of a reasonable price for gas, with a free cooker and low rentals for gas-fires, including free maintenance, of doubling his consumption; whereas the large consumer is beguiled into electricity by the tempting offers of a specially low figure if he will take current for both lighting and power. There is thus often a risk, in dealing too liberally with large gas consumers, of "pursuing the shadow and losing the substance."

In Manchester, we have kept the difference in price as close as possible—believing this to be the soundest policy. Consumers of gas within the city by automatic meter only pay 22·72 per cent. more than ordinary consumers using the largest quantity.

Our scale of net charges for gas, after deducting the discount of 2d. per 1000 cubic feet which is allowed for prompt payment, is as follows:—

Table showing Net Cost of Gas to Consumers within the City.

	Per 1000 Cubic Feet. s. d.
Ordinary consumers—	
Under 250,000 cubic feet	2 0
250,000 and under 1 million cubic feet	1 11
1 million and upwards	1 10
Gas-engines—	
Under 1 million cubic feet	1 7
1 million and under 2 millions	1 6
2 millions and upwards	1 5
Public street lamps	1 6
Automatic consumers	2 3, or 37 cubic feet for one penny.

NOTE.—Consumers outside the city—who only consume 5½ per cent. of the gas sold—are charged 3d. per 1000 cubic feet extra.

The table on next page, showing the various grades of our consumers, goes to prove that the moderate and small consumers—those consuming 50,000 cubic feet and under per annum—are still an important asset to the Manchester gas undertaking, because of the prospect of largely increasing their consumption of gas for heating and cooking. It will be seen that 168,144 of such consumers are responsible for the consumption of 42·50 per cent. of the gas sold; the remaining 17,151 for 50·98 per cent.; and public lamps, 6·52 per cent.

THE RELATION BETWEEN MUNICIPAL GAS AND ELECTRICITY UNDERTAKINGS.

The consideration of the question of competition between gas and electricity turns my thoughts to another important phase of the subject.

Twelve months ago my friend Mr. C. H. Wordingham, formerly Electrical Engineer to the Manchester Corporation, contributed an article to the "JOURNAL OF GAS LIGHTING" on the question of the fusion of gas and electricity undertakings. This article, the most important pronouncement on the question which has hitherto been made, very much interested me, because it gave expression to similar thoughts on the same subject, which had passed through my mind, as to the necessity of some co-operation between gas and electricity undertakings under municipal control, as being in the best interests of economical and efficient public service.

I say nothing on the broader question of an alliance between gas and electricity undertakings which are not under the same control, because it is fraught with difficulties that are well nigh insurmountable; and such undertakings will, I am afraid, have to plough their respective furrows as best they can.

It is, of course, the business and policy of a gas company to say, and endeavour to prove, that there is nothing to equal gas for every purpose for which it can be utilized; and the same applies to an electricity company. But this does not apply in the case of a municipality owning both undertakings. They stand on a different plane entirely, and should be administered accordingly.

There can be no doubt left in the minds of anyone who takes a broad outlook of the question that the existing methods of the entirely separate administration and management of municipal gas and electricity undertakings, with their conflicting interests, are neither conducive to economy nor satisfactory to the consumers, and that reforms could be easily introduced which would remove existing anomalies and tend to the advantage of both departments in many directions, particularly in the lowering of the selling price of their products.

Here are two commodities applicable to precisely the same uses, both of which are indispensable to the comfort and well-being of the community among whom they are distributed. The general public is totally indifferent as to which undertaking is supreme—all they require is that they shall receive sound and impartial advice as to which is best suited to their particular requirements. And no one can deny that there are numerous instances where this help is essential. The position to-day is that such advice is not available, because the business of both undertakings is conducted as though they had not the remotest connection with each other, when they are in fact two departments of the same firm, in the shape of the corporation, the borough

Consumption of Gas for the Year 1912-13.

Annual Consumption	Within the City.			Without the City.			Total.		
Ranging up to Cubic Feet.	Number of Consumers.	Quantity Consumed. Thousand Cub. Ft.	Average per Consumer. Cub. Ft.	Number of Consumers.	Quantity Consumed. Thousand Cub. Ft.	Average per Consumer. Cub. Ft.	Number of Consumers.	Quantity Consumed. Thousand Cub. Ft.	Average per Consumer. Cub. Ft.
Ordinary and Automatic Consumers.									
50,000	157,946	2,236,597	14,161	10,198	168,217	16,495	168,144	2,404,814	14,302
100,000	9,760	601,791	61,659	696	44,923	64,545	10,456	646,714	61,851
250,000	3,533	474,301	134,249	185	25,188	136,151	3,718	499,489	134,343
500,000	922	290,441	315,012	31	9,729	313,839	953	300,170	314,974
750,000	237	134,461	567,346	8	4,363	545,375	245	138,824	566,629
1,000,000	120	95,263	793,858	5	4,860	972,000	125	100,123	800,984
2,000,000	123	156,262	1,270,423	9	10,897	1,210,778	132	167,159	1,266,356
5,000,000	44	123,264	2,801,455	..	..	..	44	123,264	2,801,455
10,000,000	20	134,510	6,725,500	2	10,371	5,185,500	22	144,881	6,585,500
Above 10,000,000	17	361,692	21,276,000	..	..	..	17	361,692	21,276,000
	172,722	4,608,582	26,682	11,134	278,548	25,018	183,856	4,887,130	26,581
Power Consumers.									
1,000,000	1,341	360,235	268,632	91	16,749	184,055	1,432	376,984	263,257
2,000,000	6	10,352	1,725,333	..	..	..	6	10,352	1,725,333
3,000,000	..	..	..	..	..	..	..	..	..
Above 3,000,000	1	15,527	15,527,000	..	..	..	1	15,527	15,527,000
	1,348	386,114	286,435	91	16,749	184,055	1,439	402,863	279,960
Street Lighting. Public lamps	..	354,391	..	..	14,765	..	..	369,156	..
		5,349,087			310,062			5,659,149	

council, or urban authority, as the case may be. The result is that they are left to their own devices to push business as best they can, irrespective of the injury they may inflict on each other, which oftener than not tends to recoil on their own individual undertaking.

In common fairness to gas undertakings, I must say that they work to a fixed rate of charges, whereas in the case of many electrical undertakings the price for current is sometimes cut down to an unjustifiable figure to secure business. The position is so absurd that it will not brook a moment's reflection, and would spell bankruptcy in any other business conducting it on such lines, and without the assistance of the rates.

The obvious remedy for all this is that the general administration and policy of the two departments should be merged into one, to be called the light, heat, and power department, under the supreme control of one committee, which would, if it were composed of broad-minded and commonsense men, conduct the business in the interests of the consumers, irrespective of the ascendency of the one commodity over the other. The anomaly of one department being able to canvass for business against the other would be removed. Prices of gas and electricity would be fixed on a proper basis. Rate contributions, if any, would be fairly divided on the basis of the capital debt. Finances would be more stringently controlled, and closer supervision exercised over expenditure, and the application of the proper sums to provide for renewal and rapid obsolescence of plant secured. In large undertakings it would probably be found necessary to have sub-committees for each department, and two distinct technical staffs; but so far as the purely commercial, secretarial, and accountancy sections are concerned, this should be undertaken by one common staff, as the work is similar whether you are selling gas, electricity, or candles.

The new department should be housed in the same building, with separate show-rooms under proper technical control, equipped with apparatus demonstrating the various uses to which gas and electricity can be applied. If gas is found, after careful and impartial investigation, to be best suitable for a particular use and electricity for another, business in these different directions should be cultivated. There are plenty of outlets for both commodities; the only thing necessary being that they should be directed in the proper grooves. It is a matter of no consequence to a public authority if the bulk of the gas produced is used in one particular direction and the bulk of electricity generated in another, so long as both are making progress and paying their way; because as time goes on both gas and electricity will gradually settle down into the respective spheres for which they are so well adapted, and no amount of special pleading for the one or the other as the best for all purposes to which they can both be applied will stave that time off indefinitely.

Some of the most eminent electrical engineers recognize that the electrical generating medium of the future will be the internal combustion engine; and gas engineers are increasingly utilizing electricity for motive power in gas-works. With such a fusion of municipal gas and electricity control as suggested, there could be an interchange of power at cost price, which would be mutually advantageous.

Negotiations have been in progress for some time between the Gas and Electricity Departments of the Manchester Corporation as to a supply of gas for generating electricity. The difficulty in the way so far has been that the Gas Department has not been able to fix a sufficiently low price for gas-engines which would compare favourably with the excellent efficiency of the steam-turbine; but I am not without hope that this price will be arrived at, and the bulk of electricity in Manchester eventually generated with internal combustion engines using town's gas.

The argument might be adduced that a union of gas and electricity undertakings would stifle competition. I venture to say the contrary would be the case, as this closer connection would tend to foster keen rivalry between the two technical departments to produce both gas and electricity at the least possible cost, and place themselves in the most favourable position for securing business.

Such a combination of gas and electricity under municipal control as I have briefly outlined would, I am convinced, result in the saving of large sums of money, guard against rash and unfair competition, make for better efficiency, give greater satisfaction to the public, and enable the governing bodies of such large cities as Manchester to properly tackle and solve the smoke problem.

VALUE OF THE TECHNICAL JOURNALS OF THE INDUSTRY.

I should not like to lose this opportunity of giving my meed of praise to the value of our technical journals, and to the excellent work they have done to promote the prosperity of the gas industry. I question whether any other industry is so well served in the periodicals available to those connected with it. No one can read the "JOURNAL OF GAS LIGHTING" and the "Gas World" without recognizing the invaluable work they have done to promote its welfare and progress. The fund of sound and useful information on every conceivable subject which these periodicals serve us with is remarkable; and the difficulty is, in the midst of our multifarious duties, to assimilate their contents from week to week. Whether we are able to do this or not, they still remain as priceless works of reference.

The "Analysis of Gas Accounts," issued by the "Gas World," which I find were first published in February, 1904, for the period 1902-3 are of the greatest service. No official responsible for the success of any gas undertaking, or even those more remotely connected with the industry, should fail to have copies of these at hand, and to peruse them from time to time in order to judge how his undertaking compares with others of similar size in the various costs of manufacture, distribution, and management, and, so far as his circumstances will permit, to emulate the best of them.

There are other subjects I should like to have touched upon; but I have already exhausted my time and certainly your patience in listening to me, and must conclude by again expressing my thanks to you for electing me to the position of President of this important Institution.

Northern Star Lodge.—At last Friday's regular meeting of the Northern Star Lodge, No. 3053, held at the Midland Hotel, Manchester, the S.W. (Bro. T. W. Jordan, of Stockport) was duly elected Worshipful Master for the ensuing year, and W. Bro. W. Whatmough was re-elected as Treasurer.

Heenan Coolers.—We have received from Messrs. Heenan and Froude, Limited, of Worcester, a pamphlet furnishing particulars in regard to the above-named patent coolers, which are applicable to internal combustion engines, steam condensers, air-compressors, &c. The construction and working of the cooler are explained, and its various applications illustrated. The first cooler was introduced into this country about five years ago; and it is stated that there are now close upon a thousand of them at work here and abroad. Among those to whom they have been supplied are the Gaslight and Coke Company, who have shown their satisfaction with them by giving repeat orders.

MIDLAND ASSOCIATION OF GAS MANAGERS.

THE Annual General Meeting of the Association was held last Thursday, at the Grand Hotel, Birmingham. The principal items of business were the Inaugural Address of the new President, Mr. W. J. Rendell Baker, of Mansfield; and an informal discussion on the running of coal and coke handling machinery as applied to horizontal retorts, introduced by Mr. W. H. Adams, of Bilston. At the outset, the chair was occupied by Mr. W. S. MORLAND, of Gloucester, the retiring President. The attendance of members was good.

The first business was the confirmation of the minutes of the last meeting, which were read by the Hon. Secretary (Mr. W. G. S. Cranmer, of Willenhall).

A number of letters and telegrams of apology for absence were received. These included messages from Mr. Edward Allen, of Liverpool, the President of the Institution of Gas Engineers, and the Presidents and Secretaries of kindred Associations.

AN OLD MEMBER.

The HON. SECRETARY announced that he had had a letter from Mr. R. O. Paterson, of Cheltenham, who said he had had a notice of the annual meeting; but it seemed to him that, under the rules, his membership ceased with his retirement from active work. A case like his did not appear to be contemplated by the rules.

Mr. W. C. JONES (Brierley Hill) said he did not know whether this was the proper time to refer to the letter from Mr. Paterson; but if so, he would like to point out that Rule I. stated that persons were eligible for membership of the Association "who, by reason of their professional knowledge or experience, are, in the opinion of the Committee, qualified to assist in promoting the objects of the Association." The matter should either be referred to the Committee, or he would move that Mr. Paterson be retained as a member.

The PRESIDENT remarked that there were already several retired engineers who remained members of Association; and he thought that Mr. Paterson must be labouring under a misapprehension.

Mr. W. LANGFORD (Longton) said that on no account could they allow Mr. Paterson to withdraw from membership. If they could not keep him as an ordinary member, they could at any rate make him an honorary member. He believed Mr. Paterson was one of the founders of the Association.

Mr. H. E. COPP (West Bromwich) suggested that in any case it would be a very graceful act to make Mr. Paterson an honorary member.

The PRESIDENT thought it would be better if they could retain him as an ordinary member.

Mr. JONES expressed the opinion that the matter was one which should be dealt with by the Committee; and this was agreed to.

EXAMINATIONS FOR GAS-FITTERS.

The PRESIDENT said the next item on the *agenda* referred to the examination of gas-fitters. A letter had been received from the Institution of Gas Engineers with reference to the appointment of a local Committee, asking them to recommend someone to act in this matter. The Committee had decided to put forward the names which would be given by the Secretary.

The HON. SECRETARY then read the names, as follows: Mr. R. J. Rogers, of the Gas Department, Birmingham; Mr. J. Ferguson Bell, of Derby; Mr. James Paterson, of Cheltenham; and himself—with power to add to the number.

Mr. JONES considered the gentlemen who had been chosen were well qualified to act in that capacity. He proposed that the selection be agreed to.

Mr. J. M'COLL (Halesowen) seconded; and it was agreed to.

NEW MEMBERS.

The following gentlemen were then elected members of the Association: Mr. C. V. Townsend, of Hereford; Mr. John Wilkinson, of Nottingham; Mr. Charles Loveridge, of Wolstanton; Mr. Owen Evans, of Wrexham, and Mr. James Paterson, of Cheltenham.

ANNUAL REPORT AND ACCOUNTS.

On the proposition of Mr. HAROLD E. COPP (West Bromwich), seconded by Mr. LANGFORD, the Committee's annual report and the accounts were adopted. The former indicated the proceedings of the year, and concluded by stating that during the twelve months three new members had been elected, two had died, and one had resigned—leaving the membership at 111, as before. The expenditure amounted to £64 19s. 5d.; and the receipts (with a balance from 1912 of £79 0s. 8d.) were £123 10s. 4d.

DISTRICT ASSOCIATION REPORTS.

The PRESIDENT proposed that copies of "Reports of District Associations" be sent to all members not in arrear with their subscriptions for the past year.

Mr. W. J. RENDELL BAKER (Mansfield) seconded, and it was agreed to.

INSTITUTION COUNCIL REPRESENTATIVE.

The PRESIDENT said that, following what had been done in the past, he proposed that Mr. Baker, the incoming President, be elected as the District Representative on the Council of the Institution of Gas Engineers.

Mr. M'COLL seconded this; and it was carried.

THE NEW PRESIDENT.

The PRESIDENT said this brought his year of office to a close; but before quitting the chair he would like to thank all the members for the very great kindness they had shown him during his year of presidency. This support had enabled him to have an extremely pleasant year of office. It was now his pleasure to pass on the presidential badge to Mr. Rendell Baker; and the best he could wish him was that his year of office might be as pleasant as the one he himself had just passed through.

Mr. W. J. RENDELL BAKER (Mansfield) then took the chair, and was cordially greeted by the members. He said the first duty he owed to the Association was a very pleasant one—to propose a hearty vote of thanks to the retiring President. They all knew what Mr. Morland had done for the Association. They knew his enthusiasm, and that his heart and soul had been in the advancement of the prosperity of the Midland Association. They all admired a man who was appreciated by his Board of Directors. They had had the pleasure of visiting Gloucester, and had seen that Mr. Morland was appreciated for the work he had done there. He was sure he was voicing the opinion of one and all in tendering to him most hearty thanks for his efforts on behalf of the Association during the past twelve months.

This was seconded by Mr. C. H. WEBB (Stourbridge), and cordially agreed to.

Mr. MORLAND, in acknowledgment, said he thanked them very much for the kind words and vote. He took up the position of President with great trepidation, and did his best to make the meetings a success during his year. It was a great delight to have the members at Gloucester, where they saw the Cathedral, which must have interested them, even if nothing else did.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—Kindly allow me, before I preface the few remarks that I have to make, to thank you for the great honour you have done me in electing me President. I appreciate your confidence, and can heartily assure you that I will strive, during my term of office, to use my endeavours to emulate the example of the gentlemen who have preceded me in doing all I possibly can to promote the interests of the Midland Gas Association. I must apologize for the brevity of my remarks, as to-day I cannot speak much upon Mansfield, having, as you know, only been there a few months. I must leave this to some future occasion. The ordinary inclined retort-house, with its usual coal and coke handling plant, is too well known to you all to need any descriptive notes.

PURIFIER ALTERATION AT MALVERN.

I wish to bring before your notice the alteration of the purifiers at Malvern. I had originally eight boxes in two series of four, with a four-way centre-valve fitted to each. These boxes were of different sizes, varying seals, and, as units, small for their duty and most costly to work. The Council therefore decided to have them altered. The two largest were moved, the ends removed, and plates added so as to form, with two boxes, one large purifier. These two boxes, when altered, made one large box measuring 42 ft. by 18 ft. 6 in. by 5 ft. 6 in., which was used as a catch box with the boxes described below.

The remaining space in the purifier-house was utilized to form four boxes, each measuring 32 ft. by 21 ft. by 5 ft. 6 in. These four boxes were operated with a Weck valve built into the four corners of the boxes, with a four-way valve immediately under it, in order to complete the cycles of reversing. The whole of the boxes were fitted with Green's system of covers and hurdle grids; Lux material being used entirely as a purifying medium. The Lux was lightened with coke breeze in the ratio of one part coke breeze to two parts of Lux.

I might mention that sawdust was tried; but I was unable to get a sufficient quantity coarse enough. Sawdust that will pass through a sieve about eight or ten meshes to the inch is of no practical value; but if it were possible to obtain sufficient wood borings from a mortising machine, this, as lightening material, would be ideal.

A small blower was fitted to the exhauster shaft with a three-speed cone drive arranged to give 1½, 2½, and 3½ per cent. of air; the air being measured with the usual wet meter arranged with the necessary back-pressure valve. On an average, 2½ per cent. of air was admitted; and the boxes were reversed two or three times per week—not only in rotation, but the inlets reversed to become outlets and *vice versâ*. This enabled us to send the gas

upwards and downwards through the boxes. The results were extraordinary. I have seen dirty tests on four boxes, and in less than a week four clean test papers taken off the same boxes without a change of the material.

I think it is essential that a catch-box be fitted to purifiers worked on this principle of reversion, owing to slight traces of H_2S passing over when reversing the order of the four boxes. The catch-box was always the last box of the series, and, you will note, the largest of the five purifiers. The boxes ran for over two years without a change of material, and the first change showed 57·25 per cent. of sulphur. I am unable to give the complete purification costs—the material being used again; but no doubt Mr. Johns will at some future time favour us with the final costs. Suffice it to say that the purification costs dropped from over 3d. per 1000 cubic feet sold to a labour cost of under £20 in two years. This, for a works making 130 millions, I think quite justified the suggested alteration, and more than repays the annual costs of the money taken up for the installation.

METHOD OF KEEPING ACCOUNTS.

During my tenure at Malvern, it often occurred to me that the system of keeping accounts as prescribed by the Local Government Board was in need of a little alteration. The whole of the extensions (except purifiers) were carried out from revenue account. The Gilbertian system of two Government officials—viz., the Local Government Board Auditor and the Surveyor of Taxes—certifying two different results always seemed to me a paradox. Take, for instance, the first official, who, by not giving a commercial working, certifies a loss; while the second official, on the commercial basis for the same accounts and the same year, receives payment for income-tax on the commercial working for profit made. The same remarks apply to the electricity works. One year I saw a loss (Local Government Board) of £300; while the Surveyor of Taxes demanded, and received, payment of income-tax on £800 to £900. Which is correct?

The remedy to-day for the engineer to get a fair statement of profit and loss account is to carry out all extensions from a loan account, pile up the capital, and not do as the writer did and reduce the capital on the gas-works something like £35,000, and build up the electricity works, including all new plant, mains, meters, &c., from revenue. I am strongly of opinion that the sooner the blue book of suggested forms of municipal accounts is adopted the better, so that all municipal accounts would be in one form at arriving at profit or loss. I feel sure that if our Association could further matters in this direction it would result in a benefit not only to us responsible for the management, but to the people whom we have the honour to serve.

CARBONIZATION.

Never in the history of gas engineering has the question of carbonization been so much to the front. On reading the figures published in the "JOURNAL OF GAS LIGHTING" for Feb. 17, showing the comparative working results of the London and four Suburban Companies, one notes an average per ton of coal carbonized of 12,797 cubic feet of gas. Compare this with the results less than ten years ago of just over 10,000 cubic feet, and we realize what a decided advance has been made in carbonization. We also, as engineers, confess that, without the invention of the Chairman of the South Metropolitan Company, the present-day results would be very much less. What eventually will be the standard clauses one to-day cannot say; but I think we are all unanimous that a calorific standard will be the correct basis of working of the future.

There are no doubt many of you gentlemen in the same position as myself—viz., considering retort-house plant extensions and the question of verticals—and our thanks cannot be too loudly expressed in praise of the pioneers of this form of carbonization. We have also the question of coke-oven practice to consider in arriving at a decision on this very important question; and the subject, to my mind, is one very largely of local conditions—viz., the coke question and what the particular plant can give us in the form of coke for our local requirements with the particular class of coal that we have to carbonize in our district.

ELECTRICITY.

Having had charge of the gas and electricity works at Malvern, I am sure you will forgive me if I trespass for just a few moments on to the other side. We read in our Technical Press of electricity in gas-works, &c. After all, we are engineers, and have demonstrated that, under some conditions, we can, and do, apply electricity. We are now faced with the half-watt lamp. Certainly, to-day it is only for high powers; but we may rest assured that very probably this winter we shall see the half-watter for lower candle powers. The lamp is certainly going to be a competitor in some cases, if the half watt consumption is going to be maintained throughout its life. The "Lighting Journal" puts the matter very briefly: "All these improvements are to the ultimate benefit of the public and are brought about by legitimate competition; but only the maximum benefit can accrue if neither party underrates the other." I feel sure we are all broad-minded enough to welcome healthy competition, square and above board, and as a body we are pleased to see the activity that does exist on all sides with that common end in view—viz., to cheapen every man's light and power.

WIDENING THE FIELD FOR GAS.

As mentioned previously on coke, we are to-day not only in an age of engineering but of salesmanship. We have to discover new outlets for gas, now that in some cases the cooker has filled the majority of the houses, and turn our attention to the industrial application of gas to the various trades carried on in our towns. We are all proud to think that to-day manufacturers, together with us as a body, were never more alive to the possibilities of gas in this direction. I do think the future will bring us still greater scope than we have had in the past. We shall, as a body, I feel sure, follow up the splendid efforts of the National Gas Congress and Exhibition, and also the work of the British Commercial Gas Association in their efforts on behalf of gas and its uses. I urge all who possibly can to give us their assistance with papers, and help our Secretary in this direction, if it is to be only an informal discussion. We do not always want the successes; failures very often have a practical educational value.

SUBJECTS FOR DISCUSSION.

I should certainly welcome during the year a few hints as to titles for papers or friendly round-the-table chats. The question of slots might easily claim an afternoon's discussion. We have at Mansfield only this last week abolished the discount system, and reduced the prices to slot consumers; making the difference between slot and ordinary consumers only 1½d. per 1000 cubic feet. This may be against all modern practice; but I can assure you that there are strong grounds for this alteration. After all, what is the extra capital per slot consumer per 1000 cubic feet of gas sold? I throw this out simply as a suggestion for the coming season's discussions.

At the conclusion of the address,

Mr. W. R. COOPER (Banbury) said he had the honour of asking those present to join with him in passing a very hearty vote of thanks to the President for his address. But before doing so, he felt sure he would not be out of place in conveying to him their deep sympathy with him in his recent painful illness, and their delight at seeing him with them that day. The address was of a practical character; and this was what they as engineers liked. The hints he had given they would be able to put into practice in due course.

Mr. MORLAND, in seconding, remarked that they all knew Mr. Baker had passed through a very bad time during the last few months; and it was wonderful that his mind had been clear enough to enable him to write such an address. He must have suffered a great deal of pain. The address would be beneficial to them all.

The vote having been passed with acclamation,

The PRESIDENT thanked the members very much for the vote they had passed for his poor efforts in the way of a Presidential Address. He wished that the address had been more; but, as Mr. Morland had said, during the last few months he had been the victim of circumstances—and very painful circumstances.

THE RUNNING OF COAL AND COKE HANDLING MACHINERY AS APPLIED TO HORIZONTAL RETORTS.

Mr. W. H. ADAMS (Bilston) then opened an informal discussion on this subject. He said:

I have, at the request of the Secretary, compiled a few notes on the working of stoking machinery with coal and coke handling plant, for the purpose of promoting an informal discussion—the idea being that members who are users of machinery will give their experiences for our mutual benefit. Therefore the contribution should not be considered as a "paper" dealing exhaustively with the subject, but merely as an expression of experience which may or may not be of some interest to members contemplating machinery.

Some four years ago it became necessary for us to reconstruct our retort-house; the benches having been in use for upwards of 35 years. The arches naturally were in a bad state; and this being so, it was decided that a stage-floor retort-house, with machinery, should be built. The existing cellar could have been retained; but as the building had to be raised to accommodate the overhead coal hoppers, it was considered advisable to go sufficiently high to improve the working conditions. Having settled this point, the question arose as to which was the best type of machine to instal—projector or otherwise. Several works were visited, and various types of machines seen in operation; and finally we came to the conclusion that a projector would be the best machine for us, principally on the ground of expense. The old retort-house had been fitted up with West's hand stoking machines, and a coal-breaker, having a capacity of 15 tons per hour, was retained; the new elevator and conveyor being designed to incorporate this breaker in the complete plant.

POWER PLANT.

The electric power is generated by a gas-engine capable of developing 50 and 44 B.H.P. constant load, coupled direct with flexible coupling to a 30 K.W. generator. This plant is in duplicate, and is of ample size for the work. The current is led from a suitable switchboard, fitted with the necessary switch-gear, to the point required.

COAL BREAKING, ELEVATING, AND CONVEYING MACHINERY.

The coal breaking, elevating, and conveying machinery is driven by a 20 H.P. motor fixed in the basement of the retort-house; the breaker being driven direct from the motor by belt, and the power transmitted to the elevator head by a combination

of belt and bevel-wheel transmission. The stoking machine is also driven by a motor of the same power; the two being interchangeable.

Stoking Machinery.

The stoker is a combined charging and discharging machine; the ram being actuated by wire ropes. The power for travelling, charging, and discharging is transmitted by friction clutches; while that for raising and lowering is through a positive clutch. The eight overhead hoppers are continuous, and have a capacity of 14 tons each, or equal to 1½ days' consumption per bed of eight retorts; the total overhead storage being 112 tons. The conveyor, of the push-plate type, is driven through gearing from the elevator. It is reversible, on account of the elevator being fixed in the middle of the house, and required to deliver coal to right or left. The outlet doors of the overhead hoppers are so placed that the stoking machine hopper, of 30 cwt. capacity, can be filled while charging or discharging the outside tier of retorts. The hopper doors are operated from the machine by a rack attachment in the usual way.

Coke Handling.

The coke plant is not of a mechanical description at all; being merely a series of sixteen hoppers, two per bed, and each of sufficient capacity to receive the contents of one retort. These are fixed beneath the stage floor; the coke being quenched by water sprays. In winter, the coke is removed by men put on specially for the work. In the summer months, however, the work is done by the stokers; the coke remaining in the hoppers until they are ready to remove it. Being a stage-floor retort-house, this wheeling is on the level.

We are working two eight-hour shifts—6 to 2 morning and 6 to 2 night. The charges are 8 cwt. per retort, and are worked off in eight hours. One machine man and two stokers do the whole of the work per shift in the summer months, when four beds are in operation. In winter, two coke wheelers per shift are added, for six or seven beds.

The cost per ton of coal carbonized amounts to 1s. 4d. for labour. This charge includes the fireman and engine and boiler attendants. If the latter are eliminated, the cost of stoking is 1s. per ton. This compares favourably with our previous cost of 2s. 6d. per ton for hand stoking. The cost of unloading coal into the elevator was the same as for hand stoking; the work being paid for at piecework rate—namely, 1·5d. per ton.

Machinery Troubles.

Now as to troubles which are liable to arise with machinery In the four years I have had only two involuntary stops with the electric plant; both occurring in the same unit, and, curiously enough, both from the same cause. What happened was that two of the bars on the commutator had become short-circuited, and, not being detected immediately, the armature coils were burnt out. This necessitated the removal of the armature to the works to have the coil re-wound. This accident happened in the night; and as at that time we had only one set, things looked very awkward. I had the burnt-out coil resoldered, cutting it out of circuit; and the machine was running again within an hour, and was kept running for a fortnight while a new armature was being made. The plant was duplicated as soon as possible after this occurrence.

The second mishap was of a similar nature, but was discovered on starting-up. In this case, the coil was not burnt out, although it necessitated the armature being sent to the works and the commutator taken to pieces for the purpose of inserting new mica between the bars. On examination it was discovered that a minute quantity of oil had crept along the shaft from the outer bearing to the back of the commutator, and this had caused the shorting. I hope the trouble is now removed altogether by the insertion on the shaft of a tight-fitting brass plate, which will prevent the oil coming out of the bearing at all.

There have been no troubles experienced with the coal-handling plant, and only a few minor mishaps with the stoking machine. The pusher being rope driven, the trouble here is replacing broken ropes—a tedious job, taking six to eight hours—and, of course, the rope breaks during charging, and more often at the beginning than at the end of the round. These breakages are due to the fact that we use the ropes to destruction, as we find it as easy to replace broken ropes as half worn ones—thus securing the full value of the rope. On two occasions we have had to replace a broken plate in the projector drum.

Other mishaps have been due to the human element, such as forgetting that the coal-hopper doors were open and moving the machine away, with the result that the contents of the hopper have been let down on to the floor, half burying the machine. This has been overcome by the introduction of an automatic locking bar, which prevents the machine being moved if the hopper doors are open.

Our retorts are 20 feet through, and we have one 8-inch diameter ascension-pipe at the discharging end. I am not sure that this is the right position for the ascension-pipe with a projector type of machine, for the reason that occasionally we get rather over our proportion of slack, and then we find the projector fails to deliver the coal at the far end, with the result that we have considerable trouble with stopped pipes. When the charges are well up and level, we have no trouble at all with stopped pipes.

On the whole the plant has worked well, giving good results; the savings effected and improved working having more than paid the cost of the installation.

Generally, these are my experiences; and I shall be glad to hear what members have to say in regard to the types of machines they have working; whether a number of motors controlling each movement on the machine is better than one; whether continuous hoppers are more desirable than central ones, having regard to the extra cost and the necessity of having a conveyor; what sized works could adopt stoking machinery profitably; and for what size should telpher (or other) plant displace manual labour for coke handling.

DISCUSSION.

The President remarked that they had very interesting matters for discussion. Mr. Adams had asked specially two questions—what size of works was suitable for stoking machinery, and what size for telpher plant.

Mr. Charles H. Webb (Stourbridge) thanked Mr. Adams for introducing the subject, but said that, with regard to the type of plant to be adopted, it came a little too late to be of advantage to him personally. He (Mr. Webb) had already made his selection, and it was of stoking machinery not of the projector type. The reasons for his choice were chiefly that in his opinion a machine of the carrier type took the coal in without dust or nuisance in the retort-house; and the particular machine he had adopted took the coal in without packing it heavily. The only disadvantage to his mind was that if the shape of the retort was deformed, one could not get in the same weight as was possible with a projector. He chose a machine which was cheaper, because, though it was not so speedy as one of another make, it was sufficiently speedy for a works of the size he had to control. With regard to coal handling, he had an overhead siding in the coal-stores, on both sides of the retort-house; and he adopted the fixed hopper, in place of the continuous type, because, having a siding on both sides, it was necessary to have two breakers and elevators, and a cross conveyor to the charging side. A 25-ton hopper was provided, fed from the two breakers and elevators, each of 15 tons capacity. If one elevator and breaker went wrong, it was possible to shunt the coal to the other side of the retort-house, and elevate it there. The maximum consumption of coal in the winter time was from 75 to 80 tons a day; and one 15-ton elevator would be able to deal with this. On the discharging side, they had fixed a telpher. At one time, he was a little in doubt as to whether the works were sufficiently large for it to pay; but he thought so, for this reason: The carburetted water-gas plant was in line with the retort-house at one end; and after taking the coke to the quenching tank, it could be run to a small dock on the stage of the carburetted water-gas plant, so that the wheeler had simply to fill the coke-buggy and take it five yards to the generator. This had entailed no expense beyond a slight addition to the track. Another argument in favour of a telpher in his case was that by a slight further extension of the track they could load direct into railway waggons. As soon as the outside of the retort-house was reached, he put the track at the maximum gradient that the makers recommended uphill. Thus more head room was obtained, so that in case screens were needed to deal with the coke before loading into trucks, this could be arranged. But he was informed that the coke produced by machine charging, with long period carbonizing, was sufficiently large; so that if it was thoroughly quenched, and then dropped into the truck, it was still practically as good as fork-filled coke picked up in the yard and tipped into the truck. He would be glad if any members could tell him whether this was so. His plant had not been started yet, so he did not know; but he was delaying the extension of the track over the siding until he had some further information or experience. Their fixed hopper had been arranged so that the overhead structure could be extended in the line of the retorts, in order to make it continuous, without very much expense, if it should be found advantageous; but personally he thought, if a charging machine was not over-taxed, it might travel to and from a fixed hopper in the case of a small works. He was proposing to arrange his working on similar lines to those referred to by Mr. Adams—that was, to have two eight-hour shifts, from 6 to 2 o'clock, and again from 6 to 2 o'clock, with a four-hour interval and twelve hours burning off. But he was anxious to know what effect it would have on the calorific value—having the charges (say) at 6 a.m., 8.20, 10.40, and 1 o'clock, which would take until two o'clock. Then there would be a four hours' interval to 6 p.m., when the same process would be repeated. Was he to expect any trouble with the calorific value of the gas which came off just before 6 o'clock, after the four hours' interval? It had been stated that the stopped pipe difficulty almost disappeared (if not quite) with long-period carbonization; and he would like to hear whether this was so with dry mains.

Mr. G. E. Stevenson (Long Eaton) said he remembered only a few years back it was considered that works with a make of 100 million cubic feet were the minimum point at which retort machinery would pay. He started a complete plant, together with hot-coke conveyor, eight years since; and his experience had been very much the same as that of Mr. Adams. Of course, the great question was, Would it pay? But in three years the capital cost, including the interest during this period, was paid off; and since then the capital had stood at nothing. It was probably saving one-half of its cost every year. In his case, machinery certainly paid wonderfully well, and had enabled him to make more money for the Company and to reduce the price of gas; and these were not the only advantages. Local circumstances would

determine very largely the type of plant to be installed, and the amount of money one would be justified in spending. It was not possible to dogmatize about the merits of any plant; but a new works of 50 million cubic feet and upwards would be justified in looking into the question of stoking machinery. Hand-stoking in these days seemed almost incapable of being thought of. One of the main considerations was that with machinery it was possible to work with full retorts; and it was impossible with hand-charging to carbonize, as he was doing, 9½ cwt. in retorts 22 in. by 16 in. by 20 ft. It was not possible to charge so equally or so well by any other system as by the projector belt, despite its drawbacks; and there was the big advantage that, when the retorts were getting worn, or heats were slightly up or down, one could adapt the charge, even in different sections of the retort. In his own case, there was one 8-inch ascension-pipe only; and contrary to what one might be led to expect from what had appeared in some papers, he never had any extra quantity of sulphur. It was said that two ascension-pipes were necessary because of the sulphur; but he had never had more than 25 grains of total sulphur in the gas all the time. He put this down largely to the fact that the retorts were filled and well burnt off. It was not possible, he thought, to give comparable figures of machinery relating to different places. But, in addition to the smaller cost of carbonizing, one got more gas, better coke, less sulphur, no naphthalene, and no stopped pipes. It was an advantage to have electrical generating plant in duplicate. Continuous hoppers in his case certainly paid, and paid well. It was only a 150 million works, of course; and he worked twelve-hour shifts. The results of the installation generally had been extremely satisfactory; and with the capital cost of the plant standing at nothing, it was very difficult to improve upon it by any other system. When speaking of machinery, it was necessary to bear in mind the advantage of having a wide choice of coals. It was possible to adapt one's charging by the projector machine to suit the coal and system of working. He was very glad this matter had been brought forward, because they ought to realize that the bulk of their members were managers of works of less than 150 millions; and a subject which presented interest to the majority was very welcome indeed.

Mr. Fletcher W. Stevenson (Coventry) said no doubt many members were aware that at Coventry there was a new works constructed a few years ago, and built on a new site. Therefore it was easy to lay out the retort-house installation in the best manner possible; and they did so by having the coal brought in at one end and the coke taken out at the other—which seemed to be the most reasonable and simplest method. They had two "F-A." stoking machines, each working on sixteen beds of eight retorts, 22 in. by 16 in. by 20 ft. through; and the charges were of from 7½ to 8 cwt., and of six hours' duration. Mr. Brearley, in a recently published article, had commented on the figures contained in the accounts of municipal gas undertakings; and he gave the three lowest in carbonizing wages. To his (the speaker's) great surprise, he found Coventry was the lowest. Why, he could not altogether tell. He gave the Coventry figure as being 1·05d. per 1000 cubic feet sold; and there were only three undertakings which came below 1½d. Possibly the reason for Coventry's position in this respect was partly that the "F-A." was a dual machine. Perhaps another reason was that they had continuous coal-hoppers, which were an advantage. He had taken out the extra cost of these hoppers, with the additional girder work in the roof and the standards to carry them; and he found the extra cost in his case was nearly £4000—to be exact £3650. This sounded a very large amount; but it only worked out at 0·45d. per ton, taking 5 per cent. interest. Repairs and maintenance had not to be considered; and the hoppers in his case carried 2000 tons. There was plenty of head-room above the hoppers, so that the conveyor feeding them was well up, and they could be filled absolutely to the top. There was ample coal in the bunkers to work right through from 12 o'clock on Saturday to Monday morning. When considering putting in stoking machinery, it was a great advantage, where possible, to put in hoppers of ample size, so as to do away with shift men. When the work required could be done by yard men at so much per hour, it was always cheaper. The coke-handling installation at Coventry was probably different from what was usually seen, inasmuch as it consisted of a haulage plant. It was necessary for working the system adopted to have a depth of basement of 12 feet from ground to stage level, as it was not satisfactory to drop the red-hot coke into the trucks. The method adopted was to have for each bed of retorts a hopper, into which the coke was discharged. The hoppers were made with sloping cast-iron bottoms, and the front of open bars, except near the bottom, where there was a flap-door. This was raised while the hot coke was discharged into the cage, and squibbed with water. The water ran quickly off the sharp sloping bottom plates; the result being that the coke was well quenched, but was quite bright when the doors were dropped, and it fell into the waggons. A sloping gantry was built in the yard; and the trucks were drawn by an endless wire rope out of the retort-house and up the gantry, and could be discharged at any point. The greatest height above the yard-level was 28 feet, so that they could store a lot of coke very cheaply. Working the coke plant at its maximum—that was, with 32 beds going—it took seven men to operate it, for a tonnage of something like 300 per 24 hours. The system possessed the advantage that the coke retained its silvery colour, dried very quickly, and was extremely saleable. There was a curious point which arose when they changed-over from the old works to the new. The carts at the old works would carry 25 cwt.; whereas with the new arrangement for quenching they could only carry 21 cwt. This was an immense advantage; and whatever machinery was put in for handling coke should be of such a character that it would give a minimum quantity of water. He advised the members strongly, if they thought they could introduce some improvement, to test the coke for moisture before and after doing so. At Coventry, the water in their coke never exceeded 5 per cent., and was rarely more than 3 per cent. The cost of the coke-handling installation was £3636; and the average cost of repairs and maintenance over the past four years had been £295, which worked out at 0·856d. per ton of coals carbonized. The cost of maintenance and renewals had been steadily reduced year by year—which was only to be expected as the men became more thoroughly acquainted with the plant. The figures quoted included all oils, grease, stores, &c. The wages paid to the coke men and gas-engine drivers, who were all on eight-hour shifts, came to 2·37d. per ton of coal carbonized. The wages of coke wheelers with hand stoking and no machinery rose from 6·4d. per ton of coals in 1904 to 7·3d. in 1909. They would see that by the system he referred to the work was fairly cheaply done now; and wages were not by any means low at Coventry—in fact, they were high. Doubtless the plant would be hardly suitable for small works, on account of cost; and in many large works it could not be applied; but when designing a works *de novo* he could not imagine a simpler or more efficient system.

Mr. J. Brettle (Lower Gornal) remarked that his make was about 40 millions. He had to reconstruct last year, and so he decided, after investigation, on installing stoking machinery. The retorts he had were 24 in. by 16 in. by 12 ft. through; and they had vertical sides. He was getting 8 cwt. into them, and employing twelve-hour charges. The coal was passed through a breaker; and afterwards it went to a hopper holding about 10 tons. The time taken in charging the retorts was approximately 3½ minutes—that was, opening the lids, pushing out the coke, and putting in three charges of coal. The man on the machine had to get off to open the lid, then he had to go back and discharge and charge the retort, and afterwards he had to come off again and shut the lid. He had two men working three beds of sixes—one on the discharging side, and one on the machine. The plant was of the type Mr. Webb had referred to, and was driven electrically—the various movements by separate motors. There was one for charging and discharging, one for elevating the apparatus to the different tiers, and one for propelling it along the retort-house. A disadvantage he found was that, if care was not used, coal sometimes might be left a little too near the mouth, with the result that there was incomplete carbonization. This, however, could be avoided by the men being careful in their work. Another disadvantage in the case of works of the size of his was the units. His three beds of sixes were rather too much; but if he dropped off one bed, he would not have quite sufficient. Consequently, he sometimes had to miss a charge. Otherwise, he thought he should do the same thing again as he had done already. The men had a very much easier time. They did their work in their waistcoats; and this was not a very usual thing with stoking. Besides this, he got other advantages. There was an increase in the make of gas; and he had not had a stopped pipe since the beginning of November. The tar was very thin and liquid; and, generally speaking, there were benefits all round. The cost per 1000 cubic feet, as near as he could calculate it, was 1·4d. last month. This included the elevating of the coal, the discharging and charging of the retorts, and wheeling out the coke into the yard. It also included attention to the exhauster and boilers, and, of course, the generating plant.

Mr. Harold E. Copp (West Bromwich) said that before leaving the office, he picked up promiscuously a couple of old reports which gave the cost of working at West Bromwich. They were one of the early undertakings in the Midlands to adopt stoking machinery. They put in De Brouwer plant (separate machines) and an electrical generator. For nearly eight years they had worked with this one generator and just these two single machines; and he did not think they had missed more than about two draws in the whole of this period. Of course, this result was only attained by close supervision of the working of the plant. For instance, an electric motor always gave good notice when it was going to break down. One could usually tell by the sparking. As to the question of coke handling, he had been about the country and seen almost all the coke-conveyors; and at nearly all the works he went to he noticed that they were extremely busy in the shops, with links, &c., scattered about. From this he gathered that the cost of maintaining coke-conveyors was no trifle. Those who had had experience of them would, he thought, admit this. After consideration, therefore, he adopted a system of light railway, with a gauge of about 21 inches, and waggons of a capacity of 23 cubic feet, which would hold 7 or 8 cwt. of coke. This represented a very trifling capital outlay; and the maintenance and depreciation were practically *nil*. The arrangement had worked very satisfactorily; and the cost of carbonizing in 1911, per ton of coal, was as follows: Shunting trucks, 0·6d.; unloading and delivering to storage hoppers, 1·8d.; drawing and charging, 4·8d.; furnaces and attendance, 3d.; quenching and loading coke, 4·5d.; and breaking and screening coke, and delivering to carts, 1d. This made a total of 15·7d. per ton of coal. The outlay on his plant was roughly £3000; and it saved its cost entirely in two years, including interest in the interim. Since then it had been yielding a profit; but unfortunately the whole of this had been given away in increased wages. So gas engineers had to go

on improving; and nearly all their improvements were lost by increases of wages. Mr. Adams, in opening the discussion, told them he discharged his hot coke into hoppers. He (Mr. Copp) tried this, because he thought it might save the filling of coke into tipping waggons. He found, however, that he could not quench the coke. There was one slight mistake. He had the doors at the bottom of the hoppers fitted as tightly as possible; but he did not have them water-sealed, so there was a circulation of air, and any fire left in the coke was kindled and created a nuisance. No doubt Mr. Adams would tell them that he had a water-seal in connection with his doors. Other methods of quenching were tried—high-pressure jets delivering into the hopper from different points, passing a large body of water to quench the coke very quickly. But even so, the system was a failure. Therefore he removed the hoppers, and reverted to the original plan of filling into tipping waggons. One speaker had referred to the packing of coal by projectors. If they got washed or screened nuts having an elongated fracture, and charged a cold retort, and then examined the condition of the coal, they would find that all the pieces were arranged in one way, and all packed very closely together, which was not conducive to good carbonization. The way to get over this was to mix one's coals as far as possible. He had another suggestion with regard to dealing with coke which appealed to him very strongly; and he was hoping some day to carry it into effect. Having adopted verticals, however, he was obliged to forego this. The idea was to have an electrically-driven crane in the retort-house, which would take the skip and drop it in front of the retorts. A man would be operating the crane in the centre near the pivot. He would raise the skip, slew it round 90°, drop it into a quenching tank, slew it a further 90°, and discharge it into the tipping-waggon for removal. The cost of the machine would only amount to about £500. He ventured to hope that one day the idea would be put into practice. It seemed to be a very handy way of dealing with the coke. Reference had also been made to the size of coke with stoking machines. His experience was that it was very much bigger in size, and harder and better in structure. In fact, this was so marked that in West Bromwich they were easily able to obtain more for their large coke than some neighbouring gas-works. As to calorific power, he thought if one refrained from charging for so long as four hours, there would be a rapid drop in this respect. In the matter of dry mains, his experience was not very happy. He had had them in use for many years. They were not, however, designed as dry mains, but were converted; and they were always crippled for want of space. Consequently, they had all along suffered from troubles with stopped pipes. But if the dry mains and ascension-pipes were of ample size, he did not think there would be this trouble with stopped pipes.

Mr. J. R. Duff (Banbury) said his make, when he adopted machinery, was something like 70 millions; and since the machinery was put in it had amply repaid them in every way. For one thing, they were able to shut-down when desired for the week-ends. This was something to have accomplished. As to stopped pipes, he did not think last winter he had one ascension-pipe in the whole retort-house that was not stopped once or twice. It was turning over from hand to machine stoking. As soon as the change was made, they became troubled. It commenced in the tar take-off, and gradually crept up to the hydraulic main, and then to the ascension-pipes right down to the mouthpieces. They took sledge hammers and bars; and the pressure was so great that they practically blew some retorts to pieces. One day he happened to meet Mr. Berridge, and he had had just the same trouble, and succeeded in stopping it by having a dribble of water in the ascension-pipe. He (the speaker) adopted this, and had never had a stopped pipe since. The machine they used was the "F-A."; and it had not given them the slightest trouble. He did not think it had cost them 30s. since it was put in; and it had been running three years. The generating plant, also, had given no trouble. But in a little works like his, they could revert to hand stoking for a short time, when any difficulty arose. The plant was not duplicated at all; and they had not got a storage hopper. There were four stokers in the winter time; and they did everything—from emptying the trucks of coal, to taking the coke out and throwing it up in the yard. In the summer, there were three stokers. The man on the charging side slipped on and off working the machine and opening and shutting doors. On the other side, the man saw to the coke, which was run out on tip-barrows, which took a full charge. With hot-coke a man could handle these barrows, but filled with coal he could not run them at all. The size of his retorts was 22 in. by 16 in. by 20 ft.; and the charge was 8 cwt. Of course, with De Brouwer machinery they could practically do as they liked. The plant to which he had referred cost them, in round figures, a good deal under £3000. This was for coal-handling plant and everything. There was a hopper on the machine which carried about 4 tons; and this was run under the elevator. The coal was fed from the waggons direct into the crusher, and elevated into the hopper. Then the machine went and did its work, and afterwards came back again to fill up. One hopper charged about nine retorts.

Mr. W. S. Morland (Gloucester) said one thing he considered before he adopted the system he had in use at Gloucester was, What would be the most economical method of handling coal, as coal was by far the greatest tonnage of material they had to deal with in a gas-works? After consideration, he decided to make his coal-store serve the same purpose as a coal-hopper. The coal-breaker was placed outside the coal-store, and all coal as it was received was broken and elevated to a height of about 30 feet, to a conveyor which could deposit the coal in any part of the coal-store, or over a small hopper fitted with an automatic feed and coal-boot; and the elevator took the coal from this boot to the retort-house as required. They could store over this hopper several days' supply of coal; and they only required to wheel coal to the hopper in the event of the usual daily deliveries being stopped for a few days. Following on what previous speakers had said, he also was impressed by what looked to him heavy wear and tear for the amount of work done on coke-conveyors. For instance, whether a retort-house was partly or fully working, it was usually necessary to employ the full length of the conveyor for either a small or large number of retorts in use. He therefore decided to adopt tip-waggons of about 33 cubic feet capacity. The retort-house where this was adopted was first used for hand charging with regenerator settings. He placed in the cellar a railway, 2 feet gauge, putting the rails on the incline. One man placed the coke-waggon in position to receive coke from the retort; and when the waggon was full, he gave it a push, and it ran towards the coke-quenching sprays, where another man dealt with it. This man quenched the coke, and put the waggons in position as he received them, ready to be elevated by the hydraulic lift to the overhead railway, about 32 feet above the cellar level. When the coke drawing had been completed, one man put the waggons on to the lift and the other received them at the top, tipped the waggon, and returned the empty. He would strongly recommend members to make the overhead railways a good height. If this were done, one was in a position to erect screens and hoppers. The coke could then be loaded direct from the tipping-waggons over these screens into the hoppers, and be discharged into railway waggons or carts. They had found their method of handling both coal and coke a very economical one. He could not agree with a previous speaker as to there being no wear and tear on hoppers. His experience was that they rusted and scaled; and he had found it very difficult to prevent this. He had in some cases coated the bottom of the stoking machine hoppers with cement, and had found that it had protected the hopper very considerably. In other cases he had lined them with boards, which in time wore out; but they certainly preserved the sheeting of the hopper.

Mr. George Helps (Nuneaton) said the question the members had been discussing was one in which they were all interested—there was no doubt about that. The question he was going to ask was, Should they be interested in it? Was not the time past for them to talk about coal and coke handling plant? If they looked at the horizon, what did they see there? There was the half-watt lamp halving the cost of electricity. How were they going to meet it? It seemed to him there was no question that the requirement of to-day was a gas of 350 B.Th.U., or less, at 1s. per 1000 cubic feet, or better still 1d. per 100 feet; and this was what they had to get, if they wanted to keep up the reputation of their industry. He for one had no doubt that they would do it. A lot of talk had been heard about the difficulty of selling coke. Let them gasify it—if not all, at any rate a part of it—and mix it with the coal gas, and distribute it through high-pressure mains. They had heard people high up in the profession talking about flat-flame burners. Were they going to turn out a gas of high candle power for flat-flame burners for half-a-dozen people in a place? Were they going to follow such an idea as this? Was it nonsense, or was it sense? He hoped those present would agree with him that what was wanted was to carbonize the coal at the pit's mouth, gasify the coke (or that part which it would pay them to gasify), make a gas of the quality and price he had referred to, and distribute it throughout the country at high pressure. Looking ahead, he did not see gas-works dotted about the country as to-day, but simply huge units carbonizing the coal in the manner he had suggested, and distributing it throughout the length and breadth of the country.

Mr. Duff: I am the engineer to a gas company. Where are they coming in, if this is coming about?

Mr. Helps: The position will be a great deal better. We shall become distributing engineers; and to-day they get a lot more than we do. [Laughter.]

Mr. Duff: How about the shareholders?

Mr. Helps: Let us consider ourselves first.

Mr. W. C. Jones (Brierley Hill) proposed that the discussion be adjourned until the next meeting, as he thought they would be glad to hear the views of others using machinery. Personally, he had learnt a great deal that afternoon. He had just got to that stage in his works where he hoped to be able to start machinery in a few weeks' time. The discussion was one of the best he had ever listened to at their meetings.

There was no seconder to the proposal for adjournment, which therefore fell through.

The President said that before he asked Mr. Adams to reply he would like to make one or two remarks. It seemed to him that it would be better, in the case of electrical machinery, if the motors could be standardized for a particular size, so that if there were three or four of this size motors on the works one could keep a spare armature handy in case of breakdown, instead of having the power plant dislocated. As to the selection of plant, what was suitable for one place was not for another. With reference to the size of hoppers, it had to be borne in mind that some of them did not shut-down on Sundays. At Malvern, he had a duplicate waggon-tipper; and the fault he noticed was that both were put down the same hand. Unless the coal waggon was fitted

with double-end doors, or happened to be in the right position, resort had to be had to shovelling. If they were going to instal means of lifting coal waggons, they should see both hands were provided for. Mr. Morland had said they should lift up their coke 30 or 32 feet. He agreed; but what means should they adopt to lift it? At Malvern, he had a hydraulic lift, which was very nice in its day; but later on renewals were big, and the whole thing was scrapped for an elevator and push-plate conveyor, which was finally worked by two men. A point which he thought might be considered by gas engineers in conjunction with chemists was as to the best material of which to construct coke-hoppers. He had seen them peel off in flakes. If boards were used, the moisture got underneath and attacked the steel; while if cement was employed the steel still went. Ferro-concrete also had to be considered. At the present time he had under investigation the advisability of installing coal and coke hoppers on a siding within 500 yards of his works; and he had been asking himself whether it was going to pay him to do the work by conveyor or telpher, or whether he should go back to horse and cart. If it cost him £2000 or £3000 to put down mechanical means of getting coal in and coke out of his works, what was going to be the annual repayment and the cost of maintainence, repairs, and labour?

Mr. ADAMS said he really did not see why he should be called upon to reply, as he had not read a paper. The cost of his plant was £3000; and there was a clear profit of £700 a year. If anyone could show a profit on the working of plant of this kind, he was quite justified in adopting it. As to spare electrical parts, he agreed they should be carried when a works was some distance from an electrical factory; but having his plant in duplicate, and being near an electrical works, he did not think it was necessary to have a spare armature, which might cost anything up to £60 or £70. They had none of the trouble to which Mr. Copp had referred with coke-hoppers, because the doors were water-sealed. He agreed with Mr. Stevenson, of Coventry, that, having coke-hoppers, he was able to produce very hard, dry, and silvery coke. His own coke was of this character; and the moisture was not more than 4 per cent. It had been analyzed by the people who used it; and they had assured him that this was the maximum. Mr. Stevenson, of Long Eaton, had shown that the result of having stoking machinery in the retort-house had been a reduction in the price of gas. This was the thing they had to look forward to. It had been the means in his own place of enabling them to reduce the price of gas 2d. per 1000 cubic feet, notwithstanding the high price of coal. A query had been raised as to packed coal. He rather preferred this, because it was so much easier to push out. If it was put in slack, it simply pushed up in the retort if a ram was used. Then the coke would catch in the top of the retort, and could not be pushed out. He had hydraulic mains; but they could be used as dry mains.

The PRESIDENT said it had been a most valuable discussion; and personally he would be glad to see other similar ones during his year of office. They were under great obligation to Mr. Adams, who came forward when there was no paper; also to the different speakers. He proposed a hearty vote of thanks to them.

The vote was carried with applause, and the members separated.

COKE-HAULAGE PLANT AT COVENTRY.

In connection with the remarks made in the course of the discussion by Mr. Fletcher W. Stevenson, of Coventry, the following further particulars prepared by him as to his coke-haulage plant will be of interest.

The method adopted in this system is to have a hopper for each bed of retorts, into which the coke is discharged. The hoppers are made with sloping bottom, each of three cast-iron plates with wrought-iron sides, and the front made of open bars, except near the bottom of the hopper, where there is a wrought-iron flap door. This is raised while the hot coke is discharged into the cage, and the coke is squibbed with water. The water runs quickly off the sharp sloping bottom plates; the result being that the coke is well quenched, but quite bright when the doors are dropped and it falls into the waggons. Moreover, it quickly dries on the coke hearth, and retains the silvery colour as long as it is kept under cover. Analysis shows that it never contains more than 5 per cent. of water when sent out to customers. The coke-trucks are made in the Corporation's own shops, and hold 10 cwt. of coke. As the trunnions are set well below the centre of gravity, the trucks are easily tipped by one man. The total length of run is 540 feet. A sloping gantry is built in the yard; and the trucks are drawn by an endless wire rope out of the retort-house and up the gantry, and can be discharged at any point. The greatest height above the yard level is 28 feet.

The trucks run on girder rails in the basement of the retort-house, set about 1 foot above the floor, to allow of water running away under them, and to keep the wire rope clear of water and coke that is spilled. The trucks travel at the rate of about 300 feet a minute, and the rope is driven by a 30-H.P. gas-engine. The rope only runs when it is wanted to haul trucks; but the gas-engine runs light almost continuously during the winter.

The crankshaft of the gas-engine is extended on both sides; and on each side is fixed a 33 inch wide fast pulley. Each of the pulleys has an open and a crossed belt, each pair driven on a separate countershaft. When the wire ropes are at rest, these belts run on loose pulleys on the countershafts; but with a hand lever the man in charge can throw either belt on to the fast pulley on the countershaft, and by this means the direction of the rope can be changed from forward to reverse.

The rope is of flexible steel wire 2¾ inches in circumference, and 430 yards long. With full work on sixteen beds of retorts, it will last twelve months, and costs for renewal from £18 to £20. On each side of the twin retort-house the rope haulage is a separate unit, with the exception of the gas-engine, which is common to both. But the operating levers are so placed that one man can operate both sides, either together or separately, or one rope can be made to run one way while the other runs the reverse; and electric bell communication informs the operator what is wanted.

The whole of the installation, except the electric bell communication, was made and erected by the Gas Department, and cost £3636.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Annual Meeting in Manchester.

The Forty-Fourth Annual Meeting of the members of the Manchester District Institution of Gas Engineers was held last Saturday at the Grand Hotel, Manchester. Mr. J. C. BELTON, of Chester, the President, had the felicity of welcoming a large number of members from various parts of Lancashire, Yorkshire, Cheshire, and North Wales, and he was supported by several members of the Executive Council, including the two Vice-Presidents, Mr. J. G. Newbigging, M.Inst.C.E., of Manchester, Mr. Edward A. Harman, M.Inst.C.E., of Huddersfield; and Mr. Edward Allen, M.Inst.C.E., the President of the Institution of Gas Engineers. There were also present a number of the Past-Presidents of the Manchester District Institution.

The HON. SECRETARY (Mr. W. Whatmough, of Heywood) read the minutes of the last meeting; and they were confirmed.

CONDOLENCES.

The PRESIDENT afterwards referred in sympathetic terms to the death of Mr. Walter Hutchinson (of Barnsley), a Past-President of the Institution. A letter of condolence had been forwarded by the Secretary to the widow on behalf of the Institution, who were represented at the funeral by Messrs. Duxbury, Hudson, Morrison, and Watson. He asked the members to send from the present meeting an expression of their regret and condolence by rising in their places; and this was done.

The HON. SECRETARY announced that he had received a letter from Mr. William Drake, on behalf of his mother and family, in response to the vote of condolence passed at the Barnsley meeting; also a communication from Mrs. Hutchinson and family thanking the members for sympathy in their bereavement.

LETTERS FROM ABSENTEES.

Letters of apology for non-attendance at the meeting that day had been received from a large number of people, including Mr. Thomas Newbigging, D.Sc., M.Inst.C.E. (the Honorary Treasurer of the Institution), Alderman Jennison, J.P. (the Vice-Chairman of the Manchester Corporation Gas Committee), the President of the South Wales and Monmouth Association of Gas Engineers, and the President of the North British Association.

NEW MEMBERS.

The following were unanimously elected new members: Mr. Harold Clapham, of Morecambe; Mr. J. A. Brentnall, of Northwich; Mr. William Chew, of Blackpool; Mr. E. Meunier, of Chapel-en-le-Frith; Mr. H. Burton, of Ashton-in-Makerfield; Mr. Joseph Townsley, of Ashton-under-Lyne; Mr. James W. Wilson, of Thorne; Mr. William Stenton, of Elsecar.

ANNUAL REPORT AND STATEMENT OF ACCOUNTS.

The annual report states:

The Committee reported that the Institution continues to make satisfactory progress. The membership roll is now 201—showing an increase of 12 for the year. There have been four resignations; three have lapsed under rule 14; and the Committee regret to record the death of Mr. Walter Hutchinson (Barnsley) and Mr. Arthur Graham (Mansfield), both of whom were Past-Presidents of the Institution, while the former also fulfilled the office of Honorary Secretary.

After noticing the papers contributed to the transactions of the Institution last year, the report continues: The syllabus for the examination of gas-fitters, under the City and Guilds of London Institute, has now been completed; and arrangements are being made to bring the scheme into operation. The annual reports of the Lancashire and the Yorkshire Commercial Sections have been issued to the members, and contain a valuable record of the useful work of this department of the Institution. The lectures at the Manchester University continue to be successful; and a further grant of £15 has been made from the funds of the Institution. Mr. E. H. Hudson (Normanton), was again

unanimously elected the representative on the Council of the National Institution. Mr. S. E. Halliwell (Littleborough) and Mr. F. H. Pickles (Kildwick) were unanimously appointed the representatives on the Council of the Lancashire and Yorkshire Junior Associations respectively. In addition to the contribution of £15 to the University lectures, the following sums have also been subscribed: National Gas Exhibition, £5 5s.; British Commercial Gas Association, £5 5s.; Benevolent Fund of the Institution of Gas Engineers, £10 10s—total, £21. The finances of the Institution are in a satisfactory condition, the balance to credit being £55 10s.

(Signed) J. C. Belton, President.
W. Whatmough, Hon. Secretary.

The President, in the course of a brief allusion to the annual report of the Committee and the statement of accounts for the year ended Jan. 31, said there was nothing exceptional to state apart from the gas-fitters' education question. It was satisfactory to know that the syllabus for the examination under the City and Guilds of London Institute had now been completed, and that arrangements had been made for bringing the scheme into operation. Correspondence which had ensued between the Institution of Gas Engineers and the Committee had resulted in the appointment of certain gentlemen as district examiners in connection with the movement. Accrington, Liverpool, Manchester, and Salford had been recommended as centres for Lancashire; and Barnsley, Halifax, Huddersfield, and Leeds had been further suggested as centres for Yorkshire. [The President afterwards read a list of the nominations; and when these are confirmed the list will be available for publication.] He did not know whether any further recommendations would be necessary for the districts referred to; but if they were, the suggestions would doubtless meet with the consideration of the Committee. The names of members he had read out had not been definitely adopted, but had been recommended for adoption.

Mr. Charles Potts, of Hyde, proposed, and Mr. William Hill, of Stalybridge, seconded, the adoption of the statement of accounts, which showed a balance in hand of £55 10s., compared with £59 12s. 10d. for the year ended Jan. 31, 1913. Mr. Potts remarked that there were no particular features in connection with the balance-sheet, except that the subscriptions for 1914 were a little more than the previous year. This, he thought, was a healthy sign. On behalf of Mr. Hill and himself he desired to say how well the books of the Institution were kept.

British Commercial Gas Association Subscription.

Mr. H. Kendrick (Stretford) said that before the motion was put he would like to know whether it was intended to repeat the subscription of £5 5s. to the British Commercial Gas Association. The accounts of the Manchester Institution were, he considered, very healthy; the balance in hand being only about £4 less than the previous year, notwithstanding special expenditure —viz., the National Gas Exhibition, £5 5s., and the British Commercial Gas Association £5 5s. The latter were always doing good work.

Mr. Edward Allen (Liverpool): Do you propose ten guineas this year?

Mr. Kendrick: I shall have much pleasure in proposing five guineas.

This was unanimously agreed to.

Reports of the Commercial Sections.

The President said the members had already had the reports of the Commercial Sections. He did not, therefore, think it was necessary to discuss them, and suggested that they might be taken as read.

This course was agreed to.

An Honour to the Institution.

The President said that, before proceeding to the next item on the *agenda*, he desired to call the attention of members to the fact that a member of the Institution had been appointed as an Examiner of the City and Guilds of London Institute. He thought they might congratulate not only themselves on the honour which had been reflected by this appointment, but that they could also cordially congratulate Mr. Kendrick.

Mr. Kendrick having returned thanks,

The President afterwards stated that Mr. Samuel Glover, of St. Helens, had also been appointed an Examiner. They were all pleased to know that he was following his brother in this important post. It was certainly very satisfactory to them to know that so distinguished a member of their Institution had reached this position, and that he should be so honoured. The members tendered to him their hearty congratulations.

Mr. Glover, replying, said the reference to his "appointment" was, perhaps, a little previous. He understood that he had been nominated to the honourable office referred to. He had, however, accepted the office, and would perform the duties to the best of his ability if his name was accepted. He thanked his brethren of the Council for their congratulations.

District Member of the Institution Council.

The President stated that the nomination of a district member of the Institution Council for 1914-15 had been carefully considered by the Committee, and they had unanimously requested the President-elect to accept nomination. He had, however, so positively expressed his resolution not to go forward in this capacity, that the Committee had to accept his decision without alternative. They, therefore, put forward the name of Mr. Whatmough as the nominee of the district for the ensuing year.

Mr. E. H. Hudson (Normanton), in seconding the nomination of Mr. Whatmough, said he thought it was a fitting reward to him on relinquishing the duties of Hon. Secretary of the Institution. Mr. Whatmough had worked hard for several years; and they could not have made a better choice if they had gone through the whole list of members. His duties had undoubtedly been rather onerous and trying at times, for he had given a great deal of his leisure to the affairs of the Institution. He felt sure that the choice was a wise one.

The appointment was unanimously carried.

Mr. Whatmough, in replying, said he certainly appreciated the honour the members had conferred on him. He regretted the President-elect could not see his way to accept nomination.

Benevolent Fund of the Gas Institution.

A recommendation by the Committee that the sum of £10 10s. be granted to the Benevolent Fund of the Institution of Gas Engineers was also unanimously passed.

Amendment of Rules.

The President, in recommending the members to accept the proposed revision of rules (of which due notice had been given), stated that the question had occasioned a good deal of thought and careful consideration.

Mr. T. Banbury Ball (Rochdale) said it would be interesting to hear some *résumé* of what had transpired which led the Committee to arrive at the suggested alterations. They were not obvious on the face of it.

The President remarked that reference to the old rules would show what was the object in view. Rule I. (under the old rules) confined membership to two classes—members and associate members. It left no room for honorary members as provided for in the proposed amendment. Moreover, it shut the door against any member of the Institution who was not a resident engineer of a gas-works, or a man employed as a consulting engineer. They all knew there were many men connected with branches of gas manufacture—not men engaged in trade, but men occupying important posts in large undertakings—whose presence as members of the Institution was highly desirable, and whose advice on many things would be useful to them. It had for some time been felt by the Committee that something should be done to broaden the basis of the Institution, and so bring it into harmony with the parent Institution and others. It was with this object that the rules had been redrafted.

A Member stated that under Clause "C" of Rule 1 it would be quite possible to bring in as members the representatives or members of manufacturing firms.

The President replied that he did not think so. The question of admission of anyone was left in the discretion of the Committee, and they could be trusted to safeguard the interests of the Institution,

Mr. J. W. Morrison (Sheffield) asked whether the question of the admission of coke-oven plant engineers had been taken into consideration. The coke-oven engineers were an increasing body of able men who could be welcomed into the Institution if the members thought fit to have them.

Mr. R. H. Garlick (Salford) also asked a question relating to the position of outdoor superintendents under the new rule.

The President said he was very glad Mr. Garlick had raised this particular question, because it brought him (the President) at once to the *crux* of the whole matter. The case he alluded to would be one which in the ordinary course of things would be dealt with by the Committee under Clause "C" of Rule 1—viz., persons who, by reason of their professional knowledge or experience, are, in the opinion of the Committee, qualified to assist in promoting the objects of the Institution." With regard to the question raised by Mr. Morrison, he thought that Clause "C" would also apply there. The clause certainly seemed to cover the point which had been raised, and it might, perhaps, be advisable to admit coke-oven engineers as members of the Institution.

Mr. Allen cordially welcomed the elasticity in the new rules. The Assistant-Engineer of the Liverpool Company was not, under the old rules, qualified to become a full member of the Institution, although he was fully qualified in all other respects. Matters of this sort certainly needed a little adjustment. He warmly supported the action of the Committee in regard to Clause "C."

Mr. J. H. Brearley (Longwood) moved that the membership rules be not altered that day, as he thought members might like a little time to carefully consider them before they were passed. Some of them were very far-reaching, and he, for one, would certainly like to give the matter more consideration. He was in entire agreement with the proposals to leaven the Committee by introducing men of wisdom and ripe experience such as the Past-Presidents, but hoped that nothing would be done that day in regard to passing the rules *en bloc*.

Mr. S. Meunier (Stockport) agreed with the last speaker. Why was the proposed revision of rules put forward? What would be the advantages derived by the alterations? He would certainly like to know where the alterations were going to lead them to before they were passed.

The President said the chief reason for the alterations in the rules was, he thought, consequent on a question raised at a previous meeting. The matter was investigated by the Committee, who relegated the duties to a Sub-Committee. The latter afterwards submitted their views to the full Committee, who approved

them after careful and prolonged consideration. There was, however, nothing to be alarmed at in the proposed alterations. He trusted they would not defer the consideration of the amendment of the rules to another meeting. The only drastic alteration in the rules—if they cared to call it drastic—was Rule 1; and under this rule the membership question was safeguarded in all respects.

The Rules Ratified.

On the proposition of Mr. Kendrick, seconded by Mr. E. A. Harman, the proposed alterations in the rules were passed unanimously.

Presentations to Mr. Whatmough.

The President next alluded to the valuable services which had been rendered to the Institution during the last six years by Mr. Whatmough, their Hon. Secretary, who now felt a desire to be relieved of the strain and responsibility of office. It was felt by the members that they could not allow Mr. Whatmough to relinquish the office he had so worthily filled without presenting him with some token of the high esteem and deep regard in which he was held by the members generally. Some of them knew the immense amount of self-sacrifice which had to be exercised by the Hon. Secretary of an Institution like theirs. For the last six years Mr. Whatmough had ungrudgingly given up his leisure in order to be of service to the Institution; the result being that they now stood in a strong, healthy, and prosperous position. Even if they were not the premier Institution of the country, they were at any rate next door to it. Associated with Mr. Whatmough there was another whom they had thought about. He referred to Mrs. Whatmough, who had also exercised a great deal of self-sacrifice in giving up her husband in order that he might be of service to the Institution. He therefore had the greatest pleasure in asking Mr. Whatmough to accept a chiming clock and a diamond pin as some token of their gratitude, together with a ring for Mrs. Whatmough.

The inscription on the clock reads:—

> Presented to Mr. W. Whatmough by the members of the Manchester District Institution of Gas Engineers on his retirement from the office of Honorary Secretary. Feb. 28, 1914.

Mr. Allen said he was in cordial agreement with the graceful and well-chosen remarks of the President, who spoke, of course, from the high office he held as head of their Institution. He, however, simply desired to say that, as an ordinary member, he appreciated to the full the indefatigable way in which Mr. Whatmough had carried out his duties as honorary secretary.

Mr. Whatmough, in the course of a brief reply, acknowledged the compliments which had been bestowed upon him, and thanked the members for their appreciation. He felt bound, however, to admit candidly that his six years' honorary secretaryship had been a happy period. One remarkable feature of the six years' service seemed to stand out before him, and that was the fact that the period had been remarkably progressive—in fact, he did not think that in the history of the gas industry of the country there had been a more progressive time. The Manchester Institution had doubtless played an important part in this period of activity and progress. During his term of office he was glad to say the membership had increased by 30 per cent.—it now stood at over 200. This showed that those interested in the gas industry had realized their responsibility, and had come among them to combine in fighting the enemy and making the industry so progressive as it was that day. He desired, also, to bear testimony to the kind way he had been treated by the members generally. To the Executive Council also he tendered his thanks, as he did to their revered and respected Hon. Treasurer—Mr. Thomas Newbigging. He had, by the way, received from Mr. Newbigging only last week a letter, in which he remarked that now the membership of the Institution had become so strong there need not be any difficulty at all in getting members to come forward to submit papers for the "Transactions."

The President-Elect.

The induction of the President-Elect (Mr. J. G. Newbigging) was afterwards proceeded with; the retiring President stating that it afforded him much pleasure to ask so distinguished a member of the Manchester Corporation Gas Department to succeed to the office.

Mr. Newbigging, who was heartily cheered, said the first duty which devolved upon him as their newly-elected President was a most agreeable one—that of proposing their best thanks to the retiring President, Mr. Belton, for his services during his year of office. They all knew how worthily he had upheld the best traditions of the office. Not only this, but Mr. Belton was one of their best debaters; and when he spoke he always gave utterance to something of interest which was well worth listening to. They hoped now that he had gone into "retirement," in the comparative obscurity of a Past-President, that they would still have the benefit of his services.

Mr. T. Duxbury (Oldham) seconded the vote, which was carried by acclamation.

Mr. Belton briefly acknowledged the compliment.

Presidential Address.

The President then delivered his Inaugural Address, which will be found on pp. 575-81.

Thanks to the President.

At the conclusion of the reading of the address,

Mr. Allen said it afforded him much pleasure to offer his warmest personal congratulations to Mr. Newbigging on his excellent address. He desired also to thank him for the kind reference he had made to the forthcoming meeting of the Institution of Gas Engineers at Liverppol, and for the promise of interest and assistance at the meeting. He was quite sure that with Manchester and Liverpool together they were capable of anything. Might he also add that the Institution was honoured in having for its new President the son of so worthy a man as their friend Mr. Thomas Newbigging, D.Sc. They had undoubtedly listened to a most interesting address, which afforded ample material for profitable discussion. One was almost tempted to discuss the address; but, of course, this was not permissible. He could, however, be permitted to say how greatly he admired the address, and the way in which their newly-elected President drove home his points time after time. The allusion to gas and electricity departments in the closing stages of the address interested him very much; and he had the greatest pleasure in proposing a hearty vote of thanks to Mr. Newbigging for his most valuable contribution.

Mr. Meunier, in seconding, said the address was one of the utmost worth that had been presented to the Institution. It covered a great deal of valuable ground, and gave food for thought in the future. While not desiring in any way to attempt to raise a discussion on the address, he considered that with the major portion of it all thoughtful men must be in entire agreement with Mr. Newbigging. It afforded him great pleasure to second Mr. Allen's proposition.

The vote was passed by acclamation.

Mr. Newbigging, in his reply, said he was much indebted to the proposer and seconder for their kind words. If in the course of his remarks he had dealt with subjects that had interested them, he was quite satisfied.

Thanks to the Officers.

Mr. James Braddock (Radcliffe) proposed that the best thanks of the members be tendered to the officers of the Institution who had so capably discharged their duties. Reference had already been made to the excellent services of the retiring President and Hon. Secretary; but, of course, the Hon. Treasurer and the Vice-Presidents, besides the members of the Committee, were equally entitled to their thanks.

Mr. Kendrick briefly seconded, and expressed the deep gratitude of the members to the officials of the Institution for their labours, which had been of a most strenuous character during the last twelve months.

Mr. Belton, the retiring President, responded.

High-Pressure Lighting.

The question of the illumination of the streets of Manchester, which has for several months agitated members of the City Council, and culminated in the appointment of a Special Lighting Committee, was, at a later stage, referred to by the President. He invited the visitors to view the 12,000 yards of streets which the Gas Committee had under control for "experimental" purposes. Dealing with the lighting of Lower Mosley Street, Mr. Newbigging said the lamps are of 1500-candle power, and suspended by an anti-vibratory spring from a ¾-inch service-pipe attached to the arm of the tramway wire pole; the length of the arms on the poles being 10 feet. After explaining that the width of Lower Mosley Street, opposite the Midland Hotel, is 66 feet and opposite the Central Station 60 feet, the President's statement continued:

The lamps are so placed on each side of the street as to be almost midway between the building line and the centre of the road. The height to the reflector from the roadway is 19 feet. Each lamp is fitted with an automatic lighter and control cock; the latter being fixed on the service on the tramway pole about 11 feet from the pavement, and is turned on and off as required with a lamplighter's torch pole. The consumption for each lamp is 25 cubic feet of gas per hour, and the bye-pass ¼ foot per hour. The lamps from Oxford Street to opposite the station steps in Lower Mosley Street are the "Pharos," and from this point to Great Bridgewater Street the "Keith." In Windmill Street there are fixed two "Tilley" lamps.

The steel main in this street is 6 inches in diameter, and is laid on the Midland Hotel side. On the opposite side a 1½-inch pipe is run the full length of the street, and is supplied from the 6-inch main at three separate points. The pressure of gas in the mains is 80 inches water column, and is compressed at Piccadilly by a Keith-Blackman "E" size rotary compressor (in duplicate), chain driven from a 4 H.P. electric motor all on one base. It is capable of compressing 10,000 cubic feet per hour—sufficient to supply 400 lamps of 1500-candle power.

The number and power of high-pressure lamps for street and shop lighting is as follows:

Public.		Private.	
	Candle Power.		Candle Power.
5	4500	4	1500
2	3000	129	1000
108	1500	6	500

In addition to the above, there are two warehouses lighted by high-pressure gas; a tobacco establishment in Mosley Street; and several stalls in Smithfield Market—all the latter being supplied through meters.

The gas-lamps in Great Ancoats Street, Manchester (a wide thoroughfare) are also of 1500-candle power, and suspended in

the same way as those in Lower Mosley Street—from 10 feet arms; the width of Great Ancoats Street being (from building to building) 33 yards at the New Cross end and 30 yards at Union Street. The lamps are about 24 feet from the building line; and the distance apart of the poles varies. In a few cases they are about 25 yards; in other, 35; and in one case, 48 yards.

At the Swan Street end of New Cross are two "Pharos" gas-lamps; on the Great Ancoats Street side, two "Keith" lamps, ordinary pattern. From this point to Newton Street Keith "white silica cup lamps" are fixed; the lighting from here to Newton Street being by "Pharos" lamps, and at the corner of Union Street one "Graetzin" lamp.

All the lamps are lighted the same as the Lower Mosley Street lamps, with the exception of the silica lamps, which are lighted by a governed flashing bye-pass, which necessitates the pulling down (by a long pole) of chains attached to a lever cock on each lamp.

A Welcome Visitor.

A hearty welcome to the proceedings was hereabouts extended to Mr. Councillor Kay, J.P., the Chairman of the Manchester Gas Department, who said he had listened with a great deal of interest to Mr. Newbigging's address. He was greatly interested in the question of the amalgamation, or combined control, of gas and electricity departments; and he had given much thought and attention to it.

The President's Reception.

The members then adjourned for tea, after which the President held a reception. Post-prandial speeches were delivered by Mr. J. W. Morrison, Mr. Samuel Glover, Mr. James Braddock, Mr. S. Meunier, Councillor Kay, J.P., Alderman Burtles, and Councillor Tom Cook—the last three being members of the Manchester Gas Committee—on various matters affecting the welfare of the industry.

SOUTH-WEST OF ENGLAND GAS ASSOCIATION.

Meeting at Taunton.

The Seventh Annual Meeting of this Association was held on Wednesday last at Taunton—the President (Mr. P. Thomas, of Wellington) in the chair.

The Hon. Secretary (Mr. H. D. Lumb, of Chard) presented the annual report and statement of accounts—showing a satisfactory balance in hand. Reference was made in the report to the high price of coal and the unfavourable state of the residuals markets—especially that for coke. The membership of the Association continues to grow. Three names were added to the list.

The officers elected for the ensuing year were: President, Mr. W. L. Copp, of Axminster; Vice-President, Mr. H. Allen, of Wells; New Member of Council, Mr. T. K. Ponsford, of Wiveliscombe. The Hon. Secretary, Mr. H. D. Lumb (of Chard), and the Auditor, Mr. H. W. Cowling, of Sherborne, were re-elected.

Discussion of subjects mentioned in the "Question Box" occupied the attention of the members for the rest of the meeting.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

The members of the Eastern District of the Scottish Junior Gas Association paid an instructive visit of inspection on Saturday afternoon to the chemical works at Falkirk, occupied by Messrs. James Ross and Co.

The visitors were taken over the works in parties conducted by Mr. James Sutherland, junior (a partner of the firm), Mr. Ross, Mr. R. Ross, Mr. G. Hamilton, and Mr. G. Allan; and the various processes were interestingly outlined to them. The works are entirely for tar distillation; there being no shale oil whatever in use. Tar is received from various gas-works throughout the country; and it is allowed to flow into immense sunken receiving tanks, whence it runs by gravitation through pipes to the distillery works, which are some considerable distance off. It is thereafter placed in the stills in charges; and the process of distillation is undergone. Various "fractions" are made; and the residual pitch is run into extensive beds capable of holding thousands of tons of material. The party had an opportunity of examining the plant for the making of the various "fractions." The "fractions" are afterwards refined into benzol, toluol, solvent naphtha, and heavy rectified naphtha. Other products are also obtained—such as carbolic acid, cresylic acid, and pyridine bases. The visitors were conducted over the oil refinery, and also saw the oil-washing machines. They had further explained to them the working of ammonia freezing machinery which operates on a continuous principle, and which is used for the purpose of extracting the solids from certain oils which must be completely free from such matters. The sulphate of ammonia plant was seen. This is now on a continuous working process, and is in operation day and night. The saturators and superheaters of the plant are in the open. A visit was paid to the excellently equipped laboratory, where crude and finished products are tested; and the various pieces of mechanism, &c., used in such work were shown and described. The tour round the works was altogether most enjoyable and interesting, and proved to be highly instructive.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Steam-Raising by Coke.

Sir,—I notice in your issue of Feb. 24 a letter from Mr. Seabrook, of St. Marylebone, and your interesting editorial note.

I would like to mention that I have carried out some experiments during the past three months by using coke for steam-raising purposes. There are many difficulties in the way of using coke in mechanical stokers; and I am not yet convinced that the same can be of practical utility. But the results obtained on hand-fired boilers are fairly satisfactory.

These works are now run in conjunction with a refuse destructor, in which the boilers are fitted with fuel-burning grates, so that the heat from the burning refuse can be supplemented and the supply of steam regulated by the use of coal. Coke has been found to be a better heat-regulator than coal; and it remains a question of price to maintain its use.

I have not observed any damage to tubes, but have not yet had the opportunity of close inspection. I am having one of the boilers down for cleaning and inspection next week, and will make a point of writing you should any injurious effect be apparent. I, however, consider it improbable that there will be any indications of trouble in this direction.

I shall be pleased to send you in the near future some interesting figures showing the advantages that we have obtained by the use of coke in conjunction with the dust destructor.

J. Horace Bowden,
Borough Electrical Engineer and Manager.

Electricity Works, Bromley-by-Bow, E.,
Feb. 27, 1914.

Coke-Oven Gas for Town Lighting.

Sir,—On p. 506 of your issue for Feb. 24 is given a short abstract of a paper by Mr. L. D. Ford, on coke-oven gas for town lighting. You mention that it includes the Otto direct process for the recovery of ammonia in the form of sulphate.

We think it is incumbent upon us to ask you to draw further attention to a paragraph which appears in the original paper and which you have omitted in your account. The paragraph is as follows:

> "On leaving the tar-separator the gas, with a temperature of about 74° C. (165° Fahr.), passes through a superheater, consisting of a small spiral steel-tube, 1 inch (25 mm.) in outside diameter, placed inside the main, through which dry steam is blown; the effect being to raise the temperature of the gas in the main to about 85° to 95° C. (185° to 203° Fahr.). The superheater did not form part of the original plant, but was added two years later. This addition came about in the following manner. In designing the plant, it was recognized that the gas would have to be heated either beforehand or in the saturator, because it carries with it in suspension a large quantity of water vapour—the amount varying according to the temperature of the gas. It was also known that, on passing through the saturator, the gas would give up a certain quantity of this water, which would be absorbed by the acid, and so dilute the bath as to make the formation of the sulphate difficult, if not altogether impossible. Furthermore, it was known that the presence of ammonium chloride intensified this action; for while the union of sulphuric acid with ammonia is exothermic, and would thus provide heat in the bath, the union of sulphuric acid with ammonium chloride is endothermic, and would take up heat. When, therefore, much ammonium chloride is present in the gas, extra heat is absolutely essential for the proper formation of the sulphate. Koppers recognized this difficulty, and arranged his process in such a manner that the gas was superheated under conditions in which it could not pick up any more water; and it was thus only partly saturated. In effect, it was rendered not only capable of carrying its own water through the bath, but also of actually evaporating water from the bath. In designing the present plant, the gas could not, owing to Koppers' patent, be superheated, and another device was adopted—namely, that of heating-up the mother liquor by means of four lead copper-lined steam-pipes inserted in the saturator. In practice, however, this device was a complete failure; for the combination of the liberated hydrochloric acid and the heat had the effect of destroying the pipes in a week or two. In addition, the chlorine was deposited on the pipes and partly destroyed their already poor capacity for conducting heat. A new device was tried—namely, to superheat the circulating mother liquor with a special steam superheater. This also was not very successful, as the pipes under the action of heat wore out very rapidly. Finally, an arrangement was come to with Koppers, and the present device adopted, which has since proved entirely satisfactory."

Obviously, then, the direct-recovery process installed at the plant in question is a very modified form of the Otto process. It might with more accuracy have been described as the Koppers process, and Mr. Ford points out the absolute unsuitability of the original Otto process at the plant in question.

We might point out further that the arrangement made with Koppers for the use of certain of his patents only applies to Germany, and does not apply to this country, where the same difficulties as outlined by Mr. Ford are liable to be met with.

Koppers Coke-Oven and Bye-Product Company.

Sheffield, Feb. 25, 1914.

For the third time since Nov. 4 the shopkeepers and householders in Broughty Ferry who depend upon electricity for their illumination were recently put to considerable inconvenience through failure of the current. The inconvenience was soon over. The failure was caused by some hitch with the machinery at the generating works.

REGISTER OF PATENTS.

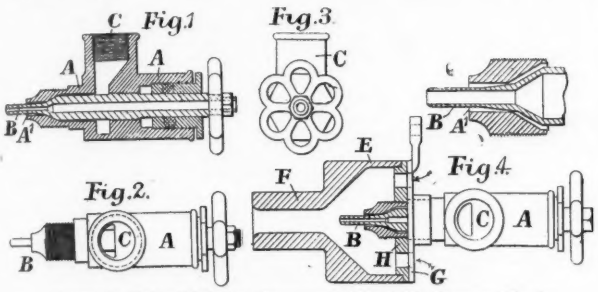
Adjustable Nipples for Gas-Burners.

SELAS LIGHTING COMPANY, LIMITED, and TURNER, E., Engineer, of Manchester.

No. 2601; Jan. 31, 1913.

This invention relates to valves or adjustable nipples for use with, particularly, the gas and air controlling and mixing arrangements of furnace bunsen burners—of the kind in which a rod or pin is adjustably mounted in an axial position in the nipple proper for the purpose of enabling the supply of gas through the latter to be regulated.

Fig. 1 is a longitudinal section, fig. 2 a plan, and fig. 3 an end elevation, of the adjustable nipple referred to; also an enlargement of part of a nipple in fig. 4. Fig. 5 is a longitudinal sectional elevation of a complete furnace bunsen burner of which the nipple of fig. 1 forms a part.



Turner's (Selas Lighting Company) Adjustable Burner Nipples.

In figs. 1, 2, and 3, A is the body portion of the nipple, and A^1 the nipple orifice. B is the cylindrical portion of the pin, manipulated by the hand wheel shown. The body portion of the nipple is cylindrical in shape, except for a lateral branch pipe C for connection with the gas supply. The front part of the hollow body portion is reduced in external diameter towards the front end, which latter is externally screw-threaded and constitutes the nose of the nipple proper. When the parts are as shown in fig. 1, no gas can pass between the seating and the spindle portion; but by screwing back the spindle as shown in the enlarged section, any desired amount of gas can be allowed to pass. A fine adjustment of the supply is afforded by the conical portion of the pin, because this co-operates with the rear edge of the cylindrical passage next the hand wheel. "The gas in passing along the passage is moulded into a hollow cylindrical column by the aid of the cylindrical portion B of the pin, and emerges as such from the orifice A^1. The cylindrical formation of the gas column is positively maintained for some distance beyond the orifice A^1 by the projecting portion B of the pin; and in order that the column may not collapse just beyond the tip of the pin, the latter is bored axially, to enable gas or air to be supplied through it to the central region of the column."

In fig. 4, the adjustable nipple is shown forming part of a bunsen burner for furnaces. E is the burner body; F the nozzle; and G an angularly adjustable disc having air holes in it to register more or less, as desired, with air holes in a base-plate H constituting the rear wall of the burner body E. The nose of the nipple screws into the plate H, and the disc G fits loosely upon the collar of the nose. The cylindrical column of gas issuing from the orifice of the nipple induces air for combustion purposes to flow into the burner body by way of the air holes shown, and to pass with the gas along the mixing passage to the orifice of the nozzle F, where it is ignited. Air or gas is passed through the axial hole in the pin spindle and pin of the nipple to balance the induced air on the outer surface of the cylindrical gas column, as already stated. The production of an intense steady flame is, of course, especially important during the first few hours after starting the furnace—that is to say, during the heating up of the furnace to the desired temperature, "and the above described burner is well adapted for this purpose." When the furnace has become well heated, its back pressure is practically constant, and any slight fluctuation of the flame is of less importance, and less gas is usually required.

Effecting Intimate Contact of Liquids and Gases.

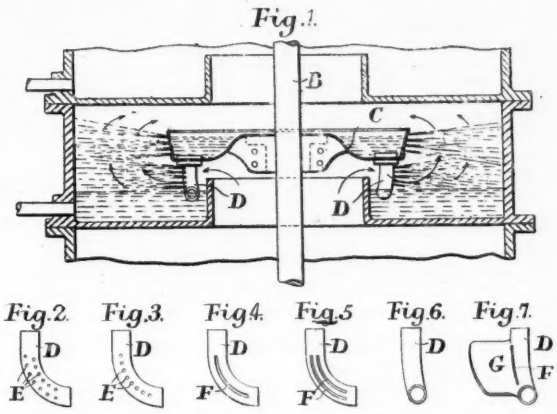
KIRKHAM, HULETT, and CHANDLER, LIMITED, and HERSEY, S., of Palace Chambers, Westminster, and BLAKE, E. W., of Thornton Heath, Surrey.

No. 7958; April 4, 1913.

This invention relates to apparatus for (for example) extracting ammonia and other impurities from coal gas.

The patentees say that in their patent No. 18,129 of 1908 apparatus was described for this purpose which comprised a casing forming a number of chambers in each of which was located a revolving tray, the periphery of which was perforated, and into which liquid was introduced from the bottom of the chamber by means of collecting scoops depending from the tray and dipping into the liquid, so that as the tray revolved the scoops picked up liquid and discharged it into the tray, whence it was projected by centrifugal force through the peripheral holes in it, and so was sprayed through the chamber up which the gas to be cleansed was caused to pass.

The object of the present invention is to provide apparatus in which the area over which the gas to be purified is subjected to contact with the liquid spray is increased in amount, so that the efficiency of the apparatus is raised. To this end it is proposed to use liquid scoops (tubular or the like) the lower ends of which dip into the liquid to be sprayed, and to provide at the outer part of the scoops a series of perforations or holes, or a continuous slit or a series of slits, so arranged and dimensioned that the liquid which is picked up as the scoops rotate is projected through these perforations, and "provides a continuous body of spray approximately from the level of the liquid in the chamber to the top of the scoops." The scoops open at their upper ends into a tray, as with the 1908 patent.



Hersey and Blake's (Kirkham, Hulett, and Chandler) Ammonia Extractor.

Fig. 1 is a sectional elevation of part of an appliance "for effecting intimate contact of liquids and gases." Figs. 2 to 7 are side elevations of forms of scoop employed.

The casing of the apparatus is as described in the 1908 patent. B is the shaft which extends vertically through it; and C is one of the trays which revolves with the shaft. D are scoops which depend from the underside of the tray and dip into the liquid as shown. They are formed upon their outer part with holes or perforations E (figs. 2 and 3), or with a single slit F, as in fig. 4, or with two slits F, as in fig. 5. These holes or slits are so dimensioned and arranged that the liquid which is forced into the scoops as they revolve with the tray is projected up the inclined scoops and is partially ejected through the perforations or slits, "so as to give rise to a continuous body of spray along the whole length of the scoops, as is shown in fig. 1. The remaining liquid passes up into the tray C, and is projected through the peripheral perforations in the ordinary manner.

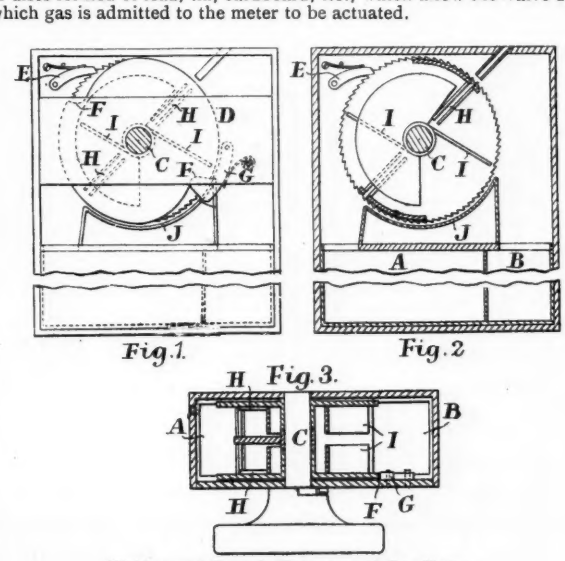
In fig. 7 is shown the application to a scoop with a lateral web G, which projects from the scoop adjacent to the slit F or other orifice or perforation.

Prepayment Gas-Meters.

WEBBER, W. A., of Peckham, and PAYNE, G. F., of West Dulwich, S.E.

No. 8779; April 14, 1913.

The invention is said to have been devised for the purpose of preventing the dishonest use of prepayment gas-meters, through the use of discs formed of lead, tin, cardboard, &c., which allow the valve by which gas is admitted to the meter to be actuated.



Webber and Payne's Prepayment Gas-Meter.

Fig. 1 shows the mechanism enclosed within a case (the front plates being removed); fig. 2 is a vertical centre section; and fig. 3 is a horizontal section of the mechanism.

The case shown (adapted to be secured to the side of a gas-meter) is preferably divided into two compartments—an upper compartment for the coin-controlled mechanism and a lower one for a removable box, which may be formed with two separate compartments—A for the pennies or other coins, and the other B for the reception of bent discs of less resistance which may be fraudulently inserted. C is a shaft

rotatably mounted in bearings in the case, and a knob is secured to the outer end of the shaft. D is a drum which is rotatably mounted on the shaft, and is constructed of two side plates and distance pieces. One side plate is made in the form of a ratchet wheel, which co-operates with a spring-actuated pawl E pivoted to the case (though it may consist of a plain disc, in which case a separate ratchet wheel would be provided). The other side plate is formed at opposite points of its periphery with notches F, of the shape shown, which co-operate, one at a time, with a spring-controlled locking-pawl G formed with a corresponding nose. The distance-pieces are formed with slots of width and length corresponding to the thickness and diameter of a penny or other coin intended to be used with the mechanism. H are shallow grooves formed on the inner faces of the side plates; and I are strips which are secured to the inner faces of the side plates of the drum with their front edges at such distance apart as to allow of the passage of the segmental-plate. J is a plate bent at its centre so as to surround part of the periphery of the drum D, and at its end to afford guides by which bent discs and pennies or the like are deflected into the appropriate compartment of the money box. Suitable means, such as a pin fixed to the case and a cut-away part on the handle or knob, would be provided to limit the angular movement of the shaft to half a revolution.

The apparatus acts in the following manner: If a dishonest consumer should insert a lead or like disc in the meter and turn the knob, the segmental plate secured to the shaft C will bear against the centre of the disc and force it from the grooves H in which it will have been retained. As a result of the disc not offering resistance sufficient to cause the locking pawl G to be disengaged from the notch F in which it rests, the drum and the segmental plate will not be locked to one another; and, consequently, there will be no movement of the drum—that is to say, the consumer will not be able to actuate the valve admitting gas to the meter. The bent disc, when it is forced out of the grooves H, will slide down the strips I and pass into the compartment B of the money box. If, however, a penny or the other required coin is inserted in the meter, it will lock the segmental arm to the drum, and the latter can be rotated through the angle necessary for the operation of the gas-admission valve, which, in the case of the mechanism illustrated, is half a revolution. When the drum has been so rotated, the coin, which will have been retained in the grooves H, will be free to drop into the compartment A of the money box.

Packing Incandescent Gas-Mantles.

ROBIN, J. I., of Great Titchfield Street, W.

No. 24,538; Oct. 29, 1913.

This invention comprises a method of treating or packing incandescent gas-mantles which consists in inserting a solid or tubular member within the mantle-holder, or a ring secured to the mantle, so that the material of the mantle is firmly clamped between the holder or ring and the inner member. Such an arrangement, it is said, not only ensures that the material of the mantle at its end will be stretched in a direction approximately at right angles to the axis of the mantle (and therefore in the direction for giving the best bowl-like shape to the finished mantle), but also affords facilities for pulling or stretching the portion of the mantle adjacent to the mantle-holder, as is sometimes necessary after the mantle has been attached to its holder.

APPLICATIONS FOR LETTERS PATENT.

3934.—HARRISON, F. W., "Coke quenching, screening, and loading apparatus." Feb. 16.
3984.—KRIEGER, F., "Burning gases." Feb. 16.
4012.—TULLY, C. B., "Indicating and locating gas leakages." Feb. 16.
4120.—KNOEDLER, E. L., "Mantles." Feb. 17.
4180.—ROEMER, C. W. VON, and LYNDE, F. C., "Air-gas machines." Feb. 18.
4186.—HIBBERD, C. E., and GOAD, F. L., "Gas-meters." Feb. 18.
4216.—SHANNON, J., and HAMMOND, F., "Water-heaters." Feb. 18.
4242-3.—BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES., "Treating the gas liquor in small gas-works." Feb. 18.
4257.—ROBSON, W. H., "Intermittent flash-light for burners." Feb. 19.
4290.—KEITH, J. & G., "Lighting and extinguishing high-pressure gas-lamps." Feb. 19.
4391.—LOGIE, R. W., "Gas-heating." Feb. 20.
4452.—WEIL, J. A., "Gas-producers." Feb. 20.
4464.—MARKS, E. C. R., "Coke-quenching and discharging machines." (A communication from the Maschinenbau-Anstalt Humboldt.) Feb. 20.
4473.—AKTIEBOLAGET LUX. "Controlling lighting apparatus." Feb. 20.
4492.—GRIER, T., "Acetylene generator." Feb. 21.
4551.—HOFER, H., and LONGREEN, V., "Gas turbines." Feb. 21.
4552.—CAMPBELL, F. W., "Mantles." Feb. 21.
4556.—BECKET, W. H., and TROLLEY, J. H., "Burners." Feb. 21.

Lighting of West Ham Streets.—The Highways Committee of the West Ham Corporation report having had under consideration a tender from the Commercial Gas Company for the replacement of the present upright incandescent gas lighting in some of the streets by inverted "Commercial" burners of from 80 to 100 candle power, fitted in new copper lanterns, for the sum of £192, payable in equal quarterly instalments over a period of five years, and for the lighting, extinguishing, and maintenance of such lamps at the rate of £2 7s. per lamp per annum. The Committee have decided to accept the offer for a period of five years. The total number of lamps affected by the tender is 139, and the present price for lighting and maintenance is £2 9s. per lamp per annum.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read the second time and committed: Brentford Gas; British Gas Company (Hull Station); Chelmsford Gas; Gas Light and Coke Company; Longwood and Slaithwaite Gas; Skegness Gas; Stone Gas and Electricity; Whitwell Gas.

The Brentford Gas Bill has been referred to a Select Committee consisting of Lord Hylton (Chairman), the Earl of Leicester, Lord Sackville, Lord Elphinstone, and Lord Hollenden; to meet to-day, March 3.

The Abertillery and District Water Board Bill, the Cleckheaton Urban District Council Bill, and the Ellesmere Port and Whitby Urban District Council Bill have been referred to a Select Committee consisting of Lord Balfour (Chairman), the Earl of Rosse, Viscount Falmouth, Viscount Ridley, and Lord Monteagle; to meet on Monday, March 9.

Notice was given for the rejection of the West Gloucestershire Water Bill.

HOUSE OF COMMONS.

The Middlesbrough Corporation Bill was read the second time and committed.

The Kidsgrove Gas Bill, which was referred to the Examiners at the second reading, has now been committed.

Notice was given for the rejection of the Sheffield Corporation Bill.

The London and North-Western Railway Company have withdrawn their petition against the Bedwas and Machen Urban District Council Bill.

The Local Legislation Committee having been nominated by the Committee of Selection, the following Bills were submitted for its consideration:

Barnsley Corporation, City of London (Various Powers), London County Council (General Powers), Middlesbrough Corporation, Northwich Urban District Council, Ossett Corporation, Preston Corporation, St. Anne's-on-the-Sea Improvement, Sheffield Corporation, Walsall Corporation.

Sections A and B commencing on Tuesday, March 17, with the Preston and Barnsley Corporation Bills respectively.

KIDSGROVE GAS BILL.

COURT OF REFEREES—Thursday, Feb. 26.

(*Before Mr.* WHITLEY (*Chairman*), *Mr.* M'LEAN, *Mr.* ERNEST MOON, K.C., *Mr.* MOONEY, *Mr.* STAVELEY HILL, *Sir* DAVID BRYNMOR JONES, *Sir* PHIPSON BEAL, K.C., *and Mr.* WHITE.)

Mr. VESEY KNOX, K.C., appeared on behalf of the Kidsgrove Gaslight Company, and objected to *locus standi* being granted to the Staffordshire County Council and the Cheshire County Council, represented by Mr. LEWIS COWARD, K.C., and to the London Association of Accountants, represented by Mr. FREEMAN, K.C.

Mr. LEWIS COWARD, on behalf of the Staffordshire and Cheshire County Councils, said that the Bill proposed to confer further powers, both as to works and capital, upon the Company, who had not been before Parliament since 1871. A good deal turned upon clause 22, which read as follows, and the marginal note to which was—"Power to Lay Pipes, &c., for Ancillary Purposes:"

> The Company may lay down and repair, take up, relay, or renew mains, pipes, and culverts within the limits of supply for the purpose of procuring, conducting, or disposing of any oil or other materials used by them in or resulting from the manufacture of gas or any residual products thereof, or for any purpose connected with their gas undertaking, and the provisions of the Gas-Works Clauses Act, 1847, with respect to the breaking-up of streets for the purpose of laying pipes and for the protection of pipes when laid, so far as they are applicable for the purposes of this section, shall extend and apply *mutatis mutandis* to and for the purposes thereof.

The Staffordshire County Council alleged that they had 2½ miles of main roads within the area of supply; and this clause would largely increase the powers which the Company already possessed with regard to the breaking-up of these roads. The position the promoters took up was that they conceded the right of the Staffordshire County Council to be heard before the Committee so far as the ancillary works were concerned; but in respect of the area already covered by the Act of 1871, it was contended that circumstances had not sufficiently changed to warrant the County Council being given a right to appear before the Select Committee. The point was that the Company might, under clause 22, be carrying out works on the same road and at the same time for ancillary purposes, and also under the Act of 1871; and it was unfair that the County Council should have certain protective rights as regards the ancillary works and lesser rights as regards the works carried out under the Act of 1871. He also asked for *locus* in respect of clause 3, because, although this incorporated the Gas-Works Clauses Act of 1847, certain sections were excepted. Similar arguments applied to the case for the Cheshire County Council, because the Company were seeking a new area in this district. The case for the promoters seemed to be that neither County Council should be heard against the Bill, because it was an endeavour to change past legislation. But he contended that he was entitled to the same protection now under the Act of 1871 as was being granted him under clause 22 in respect of the ancillary works proposed under the Bill. His main reason for this was the enormous change in circumstances that had arisen since 1871. At that time county councils were not in

existence—they were only created in 1888. The change of conditions since then in the matter of road repairs, and also construction, had been so great that the provisions of the Gas-Works Clauses Act were not sufficient protection; and as the Gas Company's existing legislation took place 43 years ago, it was clearly a case in which somebody should appear before the Committee to speak as to present conditions, because none of the urban authorities were opposing the Bill.

The CHAIRMAN asked how a change of circumstances brought the two County Councils within the Standing Order, which stated that they must be "injuriously affected by the Bill."

Mr. COWARD claimed that he was injuriously affected by the Bill, and in support quoted the case of the Gloucestershire County Council against the Bristol Tramways Company, where *locus* was granted because of change of circumstances such as he had mentioned.

The CHAIRMAN pointed out that this was in respect of an extension of time for powers which would otherwise have lapsed. Here the Court was being asked really to revise old legislation.

Mr. COWARD said he wished to be heard against any enlargement of the scope of the undertaking.

The CHAIRMAN asked if Mr. Coward meant that the granting of the new capital powers under the Bill would enable the Company to carry out more effectively their powers under the Act of 1871, and to this extent he would be injuriously affected, as, in the absence of additional capital, the Company could not extend their undertaking.

Mr. COWARD said that was his point.

Mr. MOON remarked that in that event Mr. Coward would have to limit himself to powers granted in 1871, but unexercised to-day.

Mr. COWARD agreed that it was within the discretion of the Court to limit him in this way; and he would be prepared to accept that if necessary. With regard to the Cheshire Council, there were eight county bridges in the Company's area; and it was now becoming generally recognized that the depth of soil on bridges was not sufficient for the laying of gas-mains, having regard to the heavy mechanical traction which main roads had to bear, and it was quite common now for gas-mains to be carried outside the bridges. The Company could not be forced to do this unless he was allowed to appear before the Committee and present his case on this point. This he again contended was a sufficient change in circumstances to warrant *locus* being granted.

Mr. VESEY KNOX, on behalf of the Gas Company, first contended that the Staffordshire County Council had not a single yard of main road vested in them in the Company's area.

Mr. COWARD denied this, and called evidence on the point.

Mr. *Robert Stacey*, the chief assistant to the Clerk of the Staffordshire County Council, said there was half a mile of main road vested in, and repairable at the expense of, the County Council, within the Company's area, and also two miles of urban main roads, repairable by the Kidsgrove Urban District Council, but towards the cost of maintenance of which the County Council contributed under section 11 of the Local Government Act of 1888.

Mr. VESEY KNOX, on this evidence, admitted that he was wrong to the extent of the half mile; but even so, it seemed to him to be a very hard thing upon a small Company to be put to the expense of a fight with the Staffordshire County Council over half a mile of road. The case for the two County Councils was really a complaint against past legislation, and there was no principle more clearly laid down than that the Court did not grant *locus* to anybody who complained of past legislation. It was true that under the Bill fresh capital powers were being granted, which might incidentally be applied to the laying of fresh mains under the powers of the Act of 1871; but it could hardly be said that there were any unexercised powers of that Act, because the Company had laid mains in practically every part of the district, and were not seeking any powers different from those which now existed to break up roads. He was willing to concede *locus* in regard to the additional area, and also as to the ancillary powers; but beyond this he did not think he could go. In support of his contention that the change of circumstances was not sufficient to warrant the grant of *locus*, he mentioned the Stalybridge Gas Transfer Bill, which transferred the gas-works to a Joint Board. Two railway companies within the limits sought to be heard, in order to obtain special clauses for the protection of their bridges and works from injury during the laying of mains. No change was asked for in the Bill in respect of this matter. The Gas-Works Clauses Act was being incorporated in it; and the Court held that the railway companies were not entitled to be heard. In that case there was a very great increase in capital powers, and a transfer of powers in addition. It was surely a very much stronger change of circumstances than an increase in the powers of a small Company. In connection with Electric Lighting Orders, county councils had fought this matter in a number of cases, but had only been granted *locus* where there was some change in the powers in the Bill.

Mr. COWARD pointed out that in the case of electric lighting, county councils had greater powers under the Electric Lighting Acts than they had in regard to gas undertakings.

Mr. VESEY KNOX replied that, in spite of this, county councils were often seeking to revise past legislation in electric lighting matters, but were never successful, except on the ground he had stated. He could not find a case in which anybody had ever been successful in obtaining *locus* to complain against past legislation, merely on the ground that a Bill gave further capital powers which might enable the existing legislation to be exercised more freely. If this were to be done, there was scarcely any limit to the extent to which the principle could be pushed.

The Committee deliberated in private for a considerable time.

The CHAIRMAN then announced that, by a majority, the Court decided in this case there were such new circumstances as to justify the granting of the *locus* asked for by the two County Councils.

Mr. FREEMAN then put the case for *locus* on behalf of the London Association of Accountants. He wished, he said, to appear against clause 44, which deals with the creation of a special purposes fund. The point of his argument was in regard to the proposal in this clause to have the fund audited by a chartered accountant or an incorporated accountant. The limitation of the work to either of these accountants precluded any member of his Association from attempting to get the work of auditing this fund. Under Standing Order 133*a*, an Association could only apply for *locus* when it sufficiently represented a "trade, business, or interest" carried on in the area covered by the Bill; and, technically, he came within the Standing Order, as there was actually a member of his Association living in Kidsgrove. Even if this were not so, however, he thought this was a case in which the Court should exercise discretion, because obviously the profession of accountancy could not be carried on in every small place in the country, and it was the custom to go to the large towns and employ accountants practising there. As clause 44 stood, only a member of the Incorporated Society of Accountants or of the Institute of Chartered Accountants could undertake the work of auditing the fund; but he claimed that his Association was in exactly the same position as the other two bodies. As a matter of fact, the Model Bill had been altered this year to get rid of the anomaly; and he could not understand why the promoters had not adopted the model form.

Mr. MOON asked Mr. Vesey Knox whether he would not have to adopt the model form when the Bill got into the House of Lords.

Mr. VESEY KNOX said the position was this: The alteration in the Model Bill had only recently been made, and there was a petition against alterations to the Bill by the Institute of Chartered Accountants. The question was really whether this was not a matter for the authorities of the House to deal with rather than to fight it out before a Committee. It would certainly have to be dealt with by one or the other. Nevertheless, he submitted that the London Association of Accountants did not come within with the Standing Orders.

The Court upheld this view, and refused *locus*.

LEGAL INTELLIGENCE.

THIEF PROOF—OR NEARLY.

When Leslie Nagel, aged 11, was charged on remand [*ante*, p. 447] before Mr. Chester Jones at the Children's Court at Old Street with stealing 2s. 7d. from an automatic gas-meter—the moneys of the Gas Light and Coke Company—the Magistrate remarked that he had spoken to the Governor of the Company about the case, and of the ease with which these automatic meters could be broken open. Addressing Mr. Margetts, Solicitor, who was present in Court in a similar charge on behalf of the Commercial Gas Company, the Magistrate said: "It would be as well if your people took this to heart." Mr. Margetts: We have a meter now that requires an iron bar to force it open.

It will be remembered that at the last hearing the boy was stated to be of a mechanical turn of mind, and that he had borrowed his father's tools, with which he had unscrewed the supply and service pipes of the meter. He had then turned the meter upside down, shaking out the money. The boy was bound over to be of good behaviour for twelve months. William Roberts and William Onley, schoolboys of Poplar, were charged with stealing 4s. 6d. from an automatic meter—the moneys of the Commercial Gas Company. Prisoners, who admitted the theft, and said they had used a bar of iron to break off the lock, were remanded.

SUCCESSFUL CLAIMS FOR GAS-GOVERNORS.

At the Southwark County Court last Tuesday, Judge Granger continued the hearing of a case which, as recorded in our columns at the time, began on Dec. 15, in which Messrs. W. Tice and Co. sued Mr. Edward Telling, the proprietor of the Pocock Arms, Caledonian Road, Holloway, for £3 15s., the cost of fitting a patent gas-governor. For the plaintiffs, it was originally stated that the governor was sold to the defendant and guaranteed, under contract, to effect a saving in the consumption of gas, and that this had taken place. The arrangement was that the machine should be fixed for six months, and that if the saving was not shown a careful test should be made to ascertain why it had not been brought about. The defendant contended that the quantity of gas consumed had increased, and that the governor was absolutely valueless. Accordingly the case was adjourned for a test to be made by an independent person; and the money, with the costs of the day, was paid into court. When the hearing was resumed, Mr. Ricketts, for the defence, said he proposed to call evidence to show that, though there was a saving of gas while the test was in progress, it was at the expense of the illuminating power. There was not sufficient gas, and the machine had to be broken open. Then the defendant obtained his proper supply of gas. The governor did not effect the saving. A stipulation in the contract was that the plaintiffs agreed not to interfere in any way with the efficiency of the light. Richard John Behenna, in the service of the Gas Light and Coke Company, said he visited the Pocock Arms on the 12th of December, and tested the governor, which was not working. He again saw it on the 6th of January, when the test was made, and it was then out of action; but by removing some weights it was put into action. He considered the test made an altogether unfair one. During the test the lights were considerably diminished. In cross-examination, witness said he did not hear Mr. Telling or anyone else say there was not sufficient light on this occasion. Other evidence having been given, his Honour said the question he had to decide was whether there was sufficient light on the defendant's premises; and he had come to the conclusion that at the time of the test no complaint was made in this respect. There would therefore be judgment for the plaintiffs on the contract, with costs.

Later his Honour had to determine another case, in which Messrs. Tice and Co. sued Mr. H. Knight, of the Chequers, Old Street, for £3 5s., the cost of a similar governor, fixed at his house. Arthur Frederick Low, a traveller in the service of the plaintiffs, said that on the 23rd of September last he saw Mr. Knight, and arranged for the purchase of a governor, which was fixed three days later. He told the defendant that if he were not satisfied that a saving of gas was effected, it would have to be proved by a short test; and to this Mr. Knight agreed. A letter of contract was sent by the plaintiffs to the defendant

confirming the arrangement. In cross-examination, witness admitted that Mr. Knight had to be pressed before entertaining the idea of purchasing the governor; but he denied that he told defendant he could have a governor on trial, or that if he did not like it his firm would remove it. Evidence for the plaintiffs was called to show that letters embodying the contract, and appertaining to a test, had been despatched to the defendant, who had told another representative of the firm that he would not pay for the machine nor allow a test to be made. Defendant was called, and swore that he told the plaintiffs' representative (Mr. Low) that if he thought anything more of his offer to supply a governor he would let him know. He was surprised when a representative called with the machine, which it was understood he was to have on trial for three months, and if his gas bill did not show a saving of from 20 to 25 per cent. the plaintiffs would take the governor back free of charge. He offered to show another representative his gas index-card, which he thought was the best test that could be taken. The card showed a great increase in the consumption of gas. Witness denied receiving the letters of contract and test from the plaintiffs. Mr. Ricketts, for the defendant, described the governor in question as worthless, and he threw out the challenge to anyone to prove that it was not so. If, he said, any independent person could prove that the governor did what it was claimed to do, his clients would be willing to pay for it. There might be a temporary saving of gas by the use of the governor, but it was at the expense of heat and illumination. It was remarkable that these cases should arise in London times out of number. His Honour said 95 per cent. of the purchasers were satisfied. Mr. Ricketts said he would challenge the plaintiffs to produce a single licensed victualler who would give them any sort of testimonial. His Honour, in giving judgment, said he had had these cases ever since he came to the Court. It was a little curious that people should go on having these machines if they were entirely worthless, as suggested in this case. The only question he had to decide was whether the letter embodying the contract was received. He could not believe that it was not received by the defendant. Indeed, it had been proved to his satisfaction that it was. The defendant had agreed to accept the short test in the first place, but had afterwards declined to allow it to be made. There would be judgment for the plaintiffs, with costs.

Another Valuation Appeal by the Colne Valley Water Company.

On Tuesday last the "objection" of the Colne Valley Water Company to an assessment by the Overseers of Ruislip, of £2970 gross estimated rental value and £2475 rateable value in respect of their works in the parish, was heard by the Uxbridge Union Assessment Committee, who reduced the assessment to £1420 gross and £950 rateable.

Theft of Coke from a Gas Company.

A carter named Cridland was charged at the local Police Court last week with having stolen 1 cwt. of coke, value 10d., the property of his employers, the Taunton Gas Company. Defendant was seen by a constable delivering some coke to an Italian in the town; and on being questioned, he said it was his own—he being allowed 1 cwt. every week from the works. Subsequently he admitted he took the coke. The Italian, giving evidence, stated that defendant had called at his house every Monday morning since November and sold him 1 cwt. of coke, which he understood the man was allowed by the Gas Company. The Gas Manager (Mr. Alfred Edwards) said that the workmen were allowed each week 1 cwt. of coke at 5d., irrespective of the price paid by the public; but before taking it they had to get a ticket from the office authorizing the yardman to weigh and deliver the coke. No workman was allowed to take such coke before 9 o'clock in the morning on Mondays. In the case of defendant, no ticket had been issued for that particular morning. The Bench considered the theft a very serious one. As it was Cridland's first offence, however, he was let off with a fine of 20s. and 14s. costs.

Stealing Gas at Manchester.

At the Manchester City Police Court last Tuesday a man named Abbott Peacock, described as a watch and clock maker, of Upper Moss Lane, was charged with stealing gas value 1d. Mr. A. F. L. Pickford (of the Town Clerk's Department), who prosecuted, said there were alternative charges against the prisoner; but they were based on the same facts. Peacock was charged with the larceny of 37 cubic feet of gas; and he was also charged under the Gas-Works Clauses Act with fraudulently abstracting, consuming, and using gas to the same amount and value on the previous Saturday. The prisoner had a shilling prepayment meter at his shop; and during last year the whole of the money found in the meter was only 5s., which represented a consumption of 2220 cubic feet, and about 67 hours' lighting. The Corporation became suspicious, and several attempts were made to get into the house; but the inspectors had never been able to do so, unless they left a card intimating when they would call again. On the previous Saturday a gas inspector and a detective called to see the prisoner, and found the meter had been disconnected from the main, both at the inlet and outlet, and a pipe had been placed round the meter; the effect being that gas passed through the pipe instead of through the meter. Mr. Pickford added that the pipe looked as though it had been there for a considerable time. A gas-jet was burning in the back-room; and in the fire-place was a ring burner, on which was a quantity of asbestos. Since December no money had been put in the meter. Prisoner was only charged with stealing 37 cubic feet of gas, because this related to the hour when the premises were actually under observation. The Stipendary said he wished the prisoner was defended, for he seemed to be unable to grasp the seriousness of the charge. In the end, the prisoner pleaded "Guilty," and was sentenced to three months' imprisonment.

The Directors of the British Gaslight Company, Limited, propose to recommend at the half-yearly general meeting to be held later in the month (subject to audit) a dividend at the rate of 10 per cent. per annum, with a bonus of 5s. per share, for the half year ended Dec. 31.

MISCELLANEOUS NEWS.

THE GAS LIGHT AND COKE COMPANY'S NEW STANDARD.

In connection with the Gas Bills before Parliament this session the Corporation of the City of London, it is understood, have prepared a report, through its Committees, dealing with the action it is likely to take with respect to the Gas Light and Coke Company's Bill in Parliament, under which the Company propose to substitute a new standard of calorific power of gas for that prescribed under the Act of 1909, together with the mode of testing the same, and to obtain relief from the obligation now imposed to supply gas of an illuminating power of 14 candles.

We learn from the "City Press" that the City Remembrancer remarks that the calorific standard fixed by the Company's Act of 1909 is equal to 554·3 British thermal units gross per cubic foot of gas, with the liability to forfeiture should the calorific value fall to 490 B.Th.U. on an average of three days, or to 472 B.Th.U. on any single day. By clause 4 the Company substitute for the above figures 540, 475, and 447 B.Th.U. respectively—a material diminution. The Remembrancer has also been informed that at the testing-stations in London (excluding the City) the average figures have been 618, 541, and 488·5 B.Th.U. during the three years 1910-12; showing that the tests imposed by the Act are not unduly severe. He understands that, since the powers of the London Gas Act, 1905, removed the restrictions as to the permitted amount of sulphur impurity, the average amount of sulphur impurity in the Company's gas has risen appreciably, and that it compares unfavourably with that of the other London Gas Companies. The Committee may therefore be advised that the Corporation should endeavour to obtain some restriction as to the amount of sulphur impurity allowed. The Remembrancer adds that the Streets Committee have had under consideration the effect of the proposed changes upon the public lighting of the City streets if agreed to; while the County Purposes Committee have considered the effect upon gas consumers in the City generally, and have authorized him to deposit a petition against the Bill.

BELFAST GAS UNDERTAKING.

Rate Relief Policy Criticised—A Demand for Reduction in Price.

At a Special Meeting of the Belfast City Council on Friday, to deal with the estimates for the next twelve months, it was reported that the amount required for gas lighting was £27,000, against £26,660 last year; and attention was drawn to the making of a grant in aid of rates from the gas fund amounting to £10,000—the same as last year—with, in addition, £11,400 earmarked to pay interest and sinking fund on the new City Hall. The high prices of coal and oil for the current year, it was mentioned, prevented the Committee from making a larger grant in relief of rates.

Alderman Craig, in moving the adoption of the Gas Committee's recommendation as to the grant in aid, said there was a strong feeling in the Committee against the giving of this large sum; and had it not been for the appeal made by Councillor James Johnston (the Chairman of the Finance Committee), and the deputation that waited upon them, the £10,000 would not have been voted, for the majority of the Committee felt that the interest and sinking fund on the City Hall was amply sufficient for the gas fund to bear. They had already given £135,000 towards the Hall. He did not object to the payments to free the Hall of debt; but he wished it to be understood that, if the majority of the Committee remained of the same mind, there would be no other payment out of the gas fund to the General Purposes Committee. It was not fair to take the profits of the gas-works and devote them to the relief of those who did not use gas at all.

Mr. Squire, in seconding, said he hoped the Gas Committee would continue the City Hall payment. At the Manchester conference, he stood almost alone in the view that the ratepayers as a whole had a right, as shareholders in the undertaking, to share the profits, whether or not they were consumers of gas. Undoubtedly the view in most of the great gas-consuming towns in England was that the consumer should get the bulk of the benefit of the monopoly.

Mr. Dempsey, as a member of the Gas Committee, objected to the grant in aid of rates, but not to the City Hall payment. Consumers, he held, ought to have the first claim; and the slot-meter consumers were entitled to special consideration, for they not only paid a higher rate for gas than ordinary consumers, but, paying, as they did, rents inclusive of rates, they got absolutely no benefit from the large sums given in relief of rates. The Gas Committee had handed to the Corporation since the undertaking was municipalized a sum of nearly £300,000; and he thought it was time they gave concessions to consumers, instead of making big presents to help to pay the rates of those who used no gas.

Mr. James Johnston pointed out that Birmingham gave £81,000 from the Gas Deparment, and £165,119 altogether from trading monopolies, for relief of rates, Bolton £20,000 from the gas undertaking, Leeds £30,000 (out of a total from trading concerns of £133,765), Leicester £32,000, Manchester £52,097 (out of a total contribution from trading undertakings of £200,756), and Nottingham, which, like Bolton, was considerably smaller than Belfast, gave £31,233 in relief of rates. He could understand the objections that had been urged if Belfast were charging a higher rate than elsewhere for gas; but, as a fact, while the charge in Belfast was 1s. 9½d. per 1000 cubic feet, Birmingham charged 1s. 10d., Leeds 2s. 2d., Leicester 2s. 4d., Manchester 2s. 2d., and Nottingham 2s. 4d. These were important, well-managed towns; and it was evident that the principle of applying profits from trading monopolies to relief of rates was regarded as sound and just in these centres. Belfast, too, gave a greater number of cubic feet of gas for their penny-in-the-slot meters than any place of which he knew.

Mr. WHEELER said they had been selling gas at considerably more than it cost to make it; while, on the other hand, they were selling electricity to certain parties at less than it cost to generate it.

Mr. RIDDELL favoured a small minimum contribution by the Gas Department to the rates. Even Parliament was taking this view. Slot-meter users paid at the rate of 2s. 5d. per 1000 cubic feet for gas which was sold to the ordinary meter consumer for 1s. 9½d.—a difference of 7½d., or 33 per cent., and he believed all the extra expense in relation to slot-meters could be covered for 3½d. per 1000 feet. In many English towns, the capital involved in slot-meter supply was much larger than in Belfast, because the corporations put in fittings. If they gave 40 cubic feet for 1d. to slot consumers instead of 35 feet, it would be only fair.

Alderman G. A. DORAN said that the reduction in the quality of gas under the last Gas Act obtained by the Corporation was tantamount to an increase in price. Why was this power taken, if it was not for the reason that it was thought enough money was not being made out of the gas undertaking? The illuminating power, and the quality generally, was inferior to what it used to be under the late Mr. James Stelfox; but the Corporation were satisfied, just because the department was making money. In his opinion, consumers should get direct benefit from economical manufacture, and not be asked to pay an increased rate while the enhanced profits were handed over to the users of electricity. He agreed with Mr. Dempsey as to consideration being extended to the poorer class of consumers.

Alderman TOUGHE believed there would be concessions in regard to the slot-meters before very long. But in order that these concessions might be made, the meters would have to be altered; and the cost involved would be £1000.

Alderman CRAIG said they had authority to reduce the candle power to 14; but it was never less than 17½.

The resolution was then agreed to.

MANCHESTER GAS CHARGES.

Cheaper Rates Proposed for Large Consumers.

A strong feeling has for some time prevailed in Manchester that the Gas Committee might reasonably reduce the price of gas to their 185,500 consumers; so it was somewhat of a coincidence that, almost simultaneously with the delivery of Mr. Newbigging's Presidential Address to the Manchester District Institution of Gas Engineers last Saturday, an official announcement should be made of proposed concessions to shopkeepers and owners of large works and other undertakings. The matter will come up for confirmation at to morrow's meeting of the City Council. The text of the circular is as follows:

REPORT OF THE FINANCE COMMITTEE ON THE GAS COMMITTEE'S PROPOSAL TO REDUCE THE PRICE OF GAS.

In accordance with Standing Order 69 (14), the Finance Committee present the following report on the financial bearings of the proposal of the Gas Committee in regard to a reduction in the price of gas. The proposal is to reduce the price—

1d. per 1000 cubic feet to ordinary consumers of over 2 million and under 3 million cubic feet per quarter;
2d. per 1000 cubic feet to ordinary consumers of over 3 million and under 4 million cubic feet per quarter;
3d. per 1000 cubic feet to ordinary consumers of over 4 million and under 5 million cubic feet and upwards per quarter; and
4d. per 1000 cubic feet to ordinary consumers of 5 million cubic feet and upwards per quarter.

The usual discount of 2d. per 1000 cubic feet for payment within one month will be allowed from the revised scale of prices.

The estimated loss of income, compared with the estimate for the current year, will be £6500.

On Jan. 22, 1913, the Council fixed, for one year, the contribution of the Gas Committee in aid of the city rate at 1⅜ per cent. on the capital expenditure, which for the current year amounts to £52,097; and the Finance Committee are assured that the Gas Committee have made their proposals, having in view a similar contribution.

It is confidently anticipated by the Gas Committee that, as a consequence of the reduction in price, there will be an increase of business, so that the estimated loss in income will not be so great as the calculation on present consumption shows.

The Finance Committee are satisfied that the proposal to reduce prices may be safely agreed to.

The subjoined statement of the Gas Committee accompanies the foregoing report:

PROPOSAL AFFECTING SOURCES OF REVENUE.

At a meeting of the Gas Committee of the Council, held the 11th day of February, 1914, it was resolved—"That the following proposal, which will affect the revenue of the Corporation, be approved and forwarded to the Finance Committee:—

Particulars.	Sale of Gas.	
	Existing Income.	Proposed Income.
That, as from the 25th of March, 1914, the prices of gas be in accordance with the annexed graduated scale, such revised prices, except in the cases of the automatic consumers and the public street-lamps, being subject to a discount of 2d. per 1000 cubic feet, conditional upon payment of the account within one calendar month from delivery thereof	£561,000	£554,500

Scale of Prices per 1000 Cubic Feet.

Gas Consumed on One Premises per Quarter.	Price Within the City.	Price Without the City.	
	s. d.	s. d.	
Ordinary consumers—			
Under 250,000 cubic feet . .	2 2	2 5	These prices are subject to a discount of 2d. per 1000 cubic feet for payment within 1 month.
250,000 and under 1 million .	2 1	2 4	
1 million and under 2 millions	2 0	2 3	
2 millions ,, 3 ,,	1 11	2 2	
3 ,, ,, 4 ,,	1 10	2 1	
4 ,, ,, 5 ,,	1 9	2 0	
5 ,, and upwards . .	1 8	1 11	
Gas-engines—			
Under 1 million cubic feet. .	1 9	2 0	
1 million and under 2 millions	1 8	1 11	
2 millions and upwards. . .	1 7	1 10	
Public street-lamps	1 6	1 9	
Automatic consumers—			NET
Cubic feet per penny . . .	37	33	

PORTSEA ISLAND GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday week—Mr. R. E. HELLYER presiding over a representative attendance.

The CHAIRMAN, in moving the adoption of the report and accounts [*ante*, p. 454], expressed the opinion that, having regard to the abnormal prices of coal and the depressed market for residuals, the result of the half-year's working might be regarded as highly satisfactory. The Directors were able to recommend the full statutory dividends, without having to encroach upon the reserves. He stated that a record increase had been created in the gas sold; the quantity being no less than 118 millions in excess of the same period of the previous year. Notwithstanding an increased output of 72 millions for the half year, and much higher prices for both coal and oil, exclusive of the amount transferred to the extraordinary renewals account, the total expenditure showed an increase of £3066 only. The amount received for gas sold in the same half of the previous year, in spite of the reduction to automatic consumers, approximating £3500 for the half year, was exceeded by £6454, and the rental of meters, cookers, &c., by £467, making a total of £6921. But, owing to the diminished quantity of coke produced, due to a change in carbonizing methods, and the lower prices obtained for residuals generally, the return from this source for the past six months was less by £7517. New chief offices and show-rooms had become imperative, owing to the growth of the undertaking. He then gave the following figures illustrating the development since the present offices were built in 1876.

	1876.	1913.	Increase.
Capital employed . . .	£177,867 ..	£482,070 ..	£304,203
Annual make of gas (millions)	275 ..	1,529 ..	1,254
Gross revenue	£66,534 ..	£253,543 ..	£187,009
Number of consumers .	6,613 ..	48,463 ..	41,850
Clerical and outdoor staffs	12 ..	70 ..	58

A perspective of the new premises was hung in the board-room; and the Chairman explained the accommodation to be provided, and stated that the work would be proceeded with immediately. Dealing with the decision of the Directors to issue new capital, he said that this was needed in respect of the additional manufacturing plant which had already been installed at the Hilsea works, at a cost of £31,800, and pointed out that no capital had been raised since 1905, subsequent to which time 32 miles of mains had been laid, 13,590 consumers had been added, and the quantity of gas sold per annum had increased by 227 millions. The outlook with regard to coal prices was more favourable, and a contract for half the supplies necessary had been made at a considerably reduced figure. But as the deliveries would not commence until May or June next, no benefit would be derived in respect of the current half year.

The resolution was carried unanimously, as was also a motion declaring the usual dividend. The customary half-yearly donation of £50 to the Portsmouth, Portsea, and Gosport Hospital was granted.

Price of Gas through Prepayment Meters at Mansfield.

At the last meeting of the Mansfield Corporation, Mr. T. Smith (the Chairman of the Gas Committee) presented a report recommending that, from April next, the quantity of gas supplied through the slot meters for 1d. should be increased from 25 to 33 cubic feet, and that consequent upon this arrangement no discount should in future be allowed. This, he explained, would have the effect of bringing the cost of the gas supplied through such meters down to 2s. 7d. per 1000 feet. The concession did not satisfy some members; and an amendment was submitted that, in addition, a discount of 1d. in the shilling should be given. It was suggested that the Committee had not paid adequate consideration to the just expectations of the 8000 consumers who had hitherto received discounts amounting to nearly £1000; but the absurdity of the suggestion was emphasized by Mr. J. F. Houghton, the ex-Mayor, who pointed out that a perpetuation of this financial rebate amounted, in effect, to converting the slot meters into a species of savings bank. Mr. Hardy urged also that the system was undesirable, and that it would be far better to charge a fair price outright than to impose a higher scale and afterwards return so much in the way of a dividend. Mr Farmilo, a well-known colliery official in the district, based his support of the amendment upon the ground that the Gas Committee could very well afford to do what was proposed; but the amendment was lost. Obviously the result was not palatable to the self-constituted representatives of the working classes; but in the light of sound finance the reasonableness of the Council's decision appeared scarcely open to question.

BARNET DISTRICT GAS AND WATER COMPANY.

Reduction in the Price of Gas—A High Make.

The Half-Yearly Meeting of this Company was held last Wednesday, at the Holborn Restaurant, W.C.—Dr. J. W. L. GLAISHER (the Deputy-Chairman) presiding.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he regretted that Mr. A. H. Baynes was not well enough to be present and preside over the meeting; and he regretted it the more because all the remarks to be made were of a particularly satisfactory kind. With reference to the capital account, it would be seen that the expenditure during the half year on the gas portion of the business was £1779. This, with an increased output of 4 million cubic feet, was satisfactory. Under the head of water, there had been spent on capital account £2085—by far the greater part being for extensions of mains to obtain increased revenue. Turning to the gas revenue account, the cost of coals and oil for the six months amounted to £7012, against £6234 for the corresponding half of the previous year. This was an increase of £778, which was entirely due to the higher price paid for coal. On repair and maintenance of works there had been spent £479 more; and the total cost of manufacture was £10,453, or an increase of £1158. The items under distribution totalled up to £4319, against £4217 last year. All the other items on the expenditure side showed little variation. In the receipts for gas there was a satisfactory increase—namely, for gas a total of £16,283, against £15,628; and for rental of meters, stoves, and fittings £1635, compared with £1466 last year (indicating an increase in the consumers). Residual products had yielded a good return; the figures being £4405, against £3973. He would like to draw the attention of the shareholders to the statement of coals, &c., from which they would see that there had been carbonized 6997 tons, which was exactly the same quantity as was carbonized in the same half of last year; and there had been used 18,212 gallons of oil, against 15,726 gallons. The coal gas made was 96,776,000 cubic feet, or 2,831,000 feet more than in the corresponding period, with the same quantity of coal—giving a make per ton of 13,831 cubic feet, against 13,426 feet. Having pointed out that the same amount of coal had been carbonized in the two half years, the shareholders were in a position to judge of the satisfactory returns from residual products—£2927 for coke (£158 more than for coke and breeze in 1912); £937 for tar (or £240 more); and £540 for sulphate (or £34 more). Thus the total increase under this head was £432. Altogether the receipts on gas account were £22,351, which was an increase of £1256; while the balance carried to profit and loss account was £4780, or £80 less than in the corresponding half year. With the great increase in the price of coals and the dullness of the coke market, he thought those present would agree with him that the results of the working of the gas department for the half year were very creditable to the Engineer and the management. Turning now to the water revenue account, all the items under maintenance, with the exception of that due to mains, showed slight increases, and made a total of £8949, against a total for the corresponding period of £8197. The total expenditure was £10,396. On the receipts side there was a very good increase; the figures being £23,437, against £21,846—an increase of £1591. The total receipts, including rents and transfer fees, amounted to £23,529. This enabled them to carry forward a balance to profit and loss account of £13,133, which was an increase of £783 for the half year. Carrying forward to profit and loss account the balances he had referred to, and adding to them profit on fittings (£252) and interest on moneys deposited (£166), there was a total profit for the half year of £18,333. Adding to this the balance from the last accounts, after paying the dividend, there was an amount of £38,751. Out of this they had had to meet the charges for income-tax £1004, debenture interest £1856, and interest on temporary loans £45; and a sum of £2000 had been added to the contingency fund. This left an available balance of £33,844; and after paying the dividend recommended, there would be a carry forward of £20,655—which was a slight increase. Under the heading of contingency fund, besides the £2000 transferred from profit and loss account, the Directors had included the balance from the workmen's insurance fund which was accumulated in past years, but the liability for which was now met by insurance. The contingency fund had been debited with £2141, the cost to date of the charging machinery; and there was being carried forward a balance of £6341 to the credit of the fund. He had already referred to the manufacturing results; but the shareholders would notice, under the head of coke, that in the past half year there had been used in manufacture 698 tons, or 16 per cent. of the make, against 846 tons, or 19 per cent. of the make, in the previous year. That the Directors had been able to present such satisfactory results of the half-year's working in both gas and water departments, in times when such high prices were being paid for raw material, was in their opinion entirely due to the efforts of Mr. F. J. Bancroft (the Engineer) and his excellent staff. He had, in conclusion, two pleasing announcements to make. The first was that, after three years of most difficult work, the Engineer had been able to report a satisfactory yield of water at North Mimms; and the second was that the Directors had decided to give the consumers the benefit of the results of good management by reducing the price of gas 2d. per 1000 cubic feet from the reading of the meters at Lady-day.

Mr. A. F. PHILLIPS seconded the motion.

Mr. H. G. HILLS inquired whether the Directors had considered the use of German coal.

The CHAIRMAN replied that they had talked about the matter; but it had gone no farther.

Mr. H. F. PARDY said the working results were marvellous. He had gone into the figures, and did not know how it was done. He suggested, however, that some leakage of ammonia might be taking place.

The resolution was then unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. PHILLIPS, dividends were declared, less income-tax, for the half year, at the rate per annum of 8½ per cent. on the "A" and "C" stocks, 7½ per cent. on the "B" stock, and £5 19s. per cent. on the "D" capital gas and water stocks.

Thereafter the retiring Directors (Mr. James L. Chapman and Mr. Samuel Cutler) were re-elected, on the proposition of the CHAIRMAN, seconded by Mr. HILLS; and the Auditor (Mr. B. Dennett Holroyd) was re-appointed, on the proposition of Mr. W. RICHARDS.

Mr. PHILLIPS proposed a hearty vote of thanks to the staff for the excellent services rendered by them during the period under review, mentioning the finding of water at North Mimms, which, he said, had enhanced the value of the Company's property.

Mr. HILLS seconded the vote, which was cordially passed, and acknowledged by Mr. DREW and Mr. BANCROFT.

Mr. R. L. ANDREWS proposed a similar vote to the Chairman and Directors; and this was seconded by Mr. RICHARDS and unanimously agreed to.

The CHAIRMAN's acknowledgment closed the proceedings.

GAS COMPANIES' REPORTS AND MEETINGS.

SOME OF THE CHIEF ITEMS OF NOTE.

Aldershot Gas, Water, and District Lighting Company.—The half-yearly ordinary general meeting of the Company was held last Friday week—Mr. W. T. Robertson (the Chairman) presiding. The Directors in their report stated that the total revenue for the six months ended Dec. 31 was £38,995, and the expenditure £29,252; leaving a surplus of £9743. After providing for the dividends on the consolidated preference stock and interest on mortgages and debentures, the Directors recommended a dividend at the rate of 6⅛ per cent. per annum on the "A" stock, 4 7/10 per cent. per annum on the "B" stock (these rates being in accordance with the sliding-scale), and 5 per cent. per annum on the "C" consolidated stock. Exclusive of works and special contracts, the sales of gas increased by 7½ per cent.; and this was again significant appreciation by the consumers of the reduction in the price of gas operating over the whole of 1913—representing a saving to the consumers of nearly £1600 per annum. Co-partnership, the report proceeded, which has now had an existence of two years, is undoubtedly appealing to the employees; and as the rate of the bonus is governed by the sliding-scale, the ultimate advantage is common to consumers, stockholders, and co-partners, whose interests are thus made mutual by the scheme. If the present price of gas continues until the end of June—and there is every hope of its so doing—the rate of bonus to the co-partners will be 4½ per cent. for the twelve months, as against 3 per cent. for the previous year. The report and accounts were adopted.

Altrincham Gas Company.—The half-yearly meeting of this Company was held last Wednesday. The accounts showed that the profits for the year amounted to £7235, which was £2885 less than the preceding year. This was accounted for by the fact that the price of gas had been reduced by 2d. per 1000 cubic feet during the year, and the increased cost of coal. In addition to this, the charges for maintenance of the works had increased by £851. The balance available for dividend was £10,177, which provided for the payment of the full statutory dividends of 10 per cent. on the original shares, and 7 per cent. on the new shares—leaving a balance of £6523 to be carried forward. The sales of gas, it was stated, had increased by nearly 11 million cubic feet.

Bristol Water Company.—This Company hold their 68th annual meeting next Saturday, when the accounts to be presented show that the revenue from water-rates for last year was £161,785—an increase of £3033 compared with the previous year. Including £7264 brought forward, the net sum shown by the revenue account to be applicable for dividend on the ordinary capital of the Company is £76,817. An intermediate dividend at the rate of 7½ per cent. per annum on the ordinary shares, and of £5 8s. 6d. per cent. per annum on the 7 per cent. maximum consolidated ordinary stock, was paid in September; and the Directors now recommend final dividends of 8 per cent. per annum on the ordinary shares, and of £5 12s per cent. on the ordinary stock of the Company—leaving £8798 to be carried forward. In order to prevent a vegetable growth which at intervals during recent years has occasioned trouble in the Oakfield Road reservoir, it has been determined to cover the reservoir; and the work is reported to be proceeding satisfactorily, and will be completed shortly. The pumping power at Oakfield Road is being increased by additional engine power, in order to provide for the growing demands of the high-level district. The capital expended during the year was £24,673. The length of mains laid was about 2¾ miles.

Canterbury Gas and Water Company.—The annual meeting of this Company was presided over by Alderman Hart, who referred to the success which had attended the introduction of high-pressure lighting into the city. The gas sold was 7 million cubic feet more than in the previous year. Under all the circumstances, the report was a very favourable one. He said they regretted very much indeed that they had no longer the services of their late Secretary and General Manager, Mr. James Burch, who had worked for the Company between forty and fifty years. When Mr. Burch came into the Company it was not a very great and flourishing affair; but by his application and industry, and his watchfulness of the interests of the shareholders, he had left it after 45 years' service in a much better condition than when he entered it. Mr. Burch's son, who they thought would step into his shoes, and who had assisted his father during the last seven or eight years, was through illness no longer on the staff of the Company. This they also very much regretted, both for his own sake and for the sake of his revered father. In seconding the adoption of the report, Mr. Silas Williamson, referring to Kent coal, stated that, though the Company had not done much with it, they had not been asleep, and were one of the first to try Snowdown coal. Unfortunately, the coal

first put on the market was quite unsuited for gas manufacture; and they then tried Tilmanstone coal, with a somewhat better result. He said "somewhat" intentionally, because it was not altogether satisfactory. He read in the newspapers that the Chairman of the South-Eastern Railway Company said Kent coal was no use for locomotives, though he had understood it was a high-class gas coal. From their experience of it—and it was backed up by others—it could not be called a high-class gas coal; and the Directors did not think they would be justified in using more than 25 per cent. of it. They had restricted its use to this percentage for the coming year; but if it got better, there was no doubt they would use a much larger proportion. Mr. Burch's retiring allowance was endorsed by the shareholders; and the appointment as Secretary of Mr. W. A. King was confirmed.

Chichester Gas Company.—The half-yearly meeting of this Company was held last week, when Mr. W. A. Walker (the Chairman) moved the adoption of the report and financial statement. The Directors said they regretted the loss sustained by the death of their late Engineer and Manager, Mr. T. E. Pye; and to fill the vacancy they had appointed Mr. T. N. Ritson. The net revenue, after providing for the interest on the debenture stock, temporary loans, &c., amounted to £2536, out of which the Directors recommended the declaration of a dividend for the half year at the rate of 8 per cent. per annum upon the "A" capital stock, and £5 12s. per cent. per annum upon the "B" and "C" capital stocks, all less income-tax. The Chairman pointed out that the total expenditure had increased by £237, of which coal absorbed £206. Rentals from meters, stoves, and fittings had gone up £26; and the income from residual products had increased by £85. The reduced income amounted to £131; and this figure, added to the increased expenditure, disclosed a difference in the balance to the credit of revenue account of £369. He felt he could say that, all things considered, the success the Company had been accustomed to of late years had been well maintained. The gas sold per ton of coal carbonized was close upon 11,300 cubic feet. The unaccounted-for gas was a fraction over 6 per cent.

Eastbourne Gas Company.—The half-yearly meeting of this Company was held on Monday of last week, under the chairmanship of Dr. G. A. Jeffery, who said the sum brought forward from the previous year was £12,326; and, with the profits, the total amount at their disposal was £19,380. The full statutory dividends would be paid. They would not, however, be quite able to do this out of the money earned. The sale of gas had increased 3 per cent.; while the number of consumers had increased by 3¾ per cent., and the number of users of stoves and meters 5 per cent. The report and dividend were adopted; and the following resolution was carried unanimously: "That the Directors be requested to prepare and carry out an arrangement whereby the officials and workmen receive an annual bonus out of the profits made, such bonus to be invested, in whole or in part (as may seem best), in the ordinary stock of the Company in the names of the individual workmen." It was agreed that it would be a good thing to give the employees a practical interest in the Company's prosperity.

East Grinstead Gas and Water Company.—The annual general meeting of the Company was held last Thursday, under the chairmanship of Mr. P. E. Wallis. The report of the Directors stated that the receipts from the sale of gas in 1913 were £7863, as compared with £7855 in 1912; from residuals, £2425, against £2377; and from water, £3676, against £3446. These amounts showed a total increase of £286 in receipts over those of the previous year. There was an available balance of £9124, from which the Directors recommended dividends of £9 10s. per cent. on the "A" stock, and £6 13s. per cent. on the "B" and "C" shares; leaving a balance of £6544 to be carried forward. The Chairman, who moved the adoption of the report and balance sheet, said the latter was most satisfactory, as it showed an increase in every department. The gas receipts had gone up by £8; but it must be remembered they reduced the price of gas in January last year by 2d. per 1000 cubic feet. If this had not been done, the increase would have been £342 more. The total quantity of gas sold was 41,039,300 cubic feet—an increase of about 1½ millions. The water department showed a satisfactory increase. The new works at Forest Row were now complete; and they had an efficient and good supply. During the year they had had to pay about £500 more for coal. The contract for the coming year, however, was at a considerably reduced price. The Analyst's report of the water was most gratifying. During the past three years the Directors had had to raise £26,400 additional capital, which had been subscribed at a substantial premium.

Exeter Gas Company.—Mr. G. Hardy Harris (the Chairman), who presided at the annual meeting of this Company, congratulated the shareholders on having had another successful year. The manufacture of gas at a profit entailed now considerably more expense, care, and forethought than in the past. The unsettled state of the labour market affected them in every way. In view of all the difficulties, it was gratifying that they were able to produce so satisfactory a balance-sheet [*ante*, p. 454]. Competition was another matter with which gas companies had to contend. The electric light was increasing in efficiency. He thought, however, that gas companies benefited by the competition, and that the production of gas would not have been so satisfactory as it was now were it not for competition. Therefore, as a company, they welcomed it, when it was reasonable and fair. The Company aimed at maintaining a high standard of purity. For illuminating purposes, the gas they now supplied was 8 per cent. above the standard. A new system of inspection and repair of fittings which was adopted last year was working well. The total output of gas last year amounted to 401 million cubic feet. There was an increased use by general consumers of 2·8 per cent., by slot meter consumers of 3·2 per cent., and by cookers of 5·97 per cent. The reduction of 2d. per 1000 cubic feet which they had made was, in the opinion of the Directors, a wise move. They had allowed the consumers to share in the advantage of the year by offering them gas at 2s. 4d. per 1000 cubic feet, which was, he believed, lower than was offered by any other works of the same size in England.

Grays and Tilbury Gas Company.—On Monday last week dividends at the rate of 8¼ per cent. per annum on the "A" shares of this Company and £5 19s. per cent. on the "B" shares were declared by the shareholders in half-yearly meeting assembled. The revenue account showed a profit of £4030, and after providing for the fixed charges and placing £380 to the renewal fund, there remained a balance to the credit of the net revenue account of £6672, of which the dividends would absorb £2897. The quantity of gas sold showed an increase of 26·56 per cent., as compared with the corresponding period of 1912. Since the Company's Act of 1913 received the Royal Assent, the gas-works at Stanford-le-Hope and Laindon had been closed-down, thereby reducing working expenses and concentrating manufacture. More than 30 miles of high-pressure mains had been laid and tested to 100 lbs. air pressure per square inch. It was agreed that the number of Directors be increased to six; and Mr. Worthington Church was elected a Director. A vote of thanks to the Manager (Mr. A. W. Sumner), the Secretary (Mr. W. F. Whittaker), and their staffs was passed—reference being made to the highly efficient manner in which they had discharged their duties and their whole-hearted devotion to the business of the Company.

Harrogate Gas Company.—The half-yearly meeting of this Company was held last Wednesday—Mr. F. Barber (the Chairman) presiding. The accounts for the year ended Dec. 31 showed a sum of £30,082 available for distribution; and the Directors recommended the payment of dividends at the full statutory rates, less ½ per cent. to be carried to the reserve fund. This would leave £24,360 to be carried forward. A statement by the Secretary and General Manager (Mr. Harry Wilkinson) shows that the quantity of gas made last year was 322,910,000 cubic feet, of which, 299,801,200 cubic feet were sold and 304,273,000 cubic feet accounted for. In moving the adoption of the report, the Chairman remarked that the conditions affecting gas undertakings last year had been adverse both to the economic production of gas and to any increase in the demand for it. However, the Company's sales of gas had gone up by 3,045,800 cubic feet, or 1 per cent. more than in 1912. Having dealt with the principal items in the accounts, the Chairman concluded by stating that the general business of the Company was of a progressive character. After much consideration, the Directors had decided to instal the Woodall-Duckham system of vertical retorts. The report and accounts were adopted, and the dividends recommended declared.

Hastings and St. Leonards Gas Company.—The shareholders of this Company meet on Thursday. The accounts to be presented for the second half of 1913 show a profit balance of £12,148, which is more than sufficient to pay all standing charges and the full statutory dividends. As compared with the corresponding half of 1912, the Board report, adverse conditions prevailed throughout. The demand for gas and coke was retarded by extremely mild weather; and the residuals market proved disappointing. The Directors, in noticing the death last October of Mr. C. E. Botley, say that the Company lost an esteemed and valued servant who had devoted 26 years to its well-being; and they "desire to place on record their deep regret at his loss and their high appreciation of his long and valuable services." The report continues: Mr. Charles F. Botley, Assoc.M.Inst.C.E., who has been in the service of the Company for 22 years, has been appointed Engineer and General Manager. The National Gas Exhibition, held in London in October, in which the Company, in association with most other gas undertakings, participated, was successful in its object, and besides showing the manifold uses of gas, emphasized the growing popularity of gas-fires, water-heaters, &c.

Leighton Buzzard Gas Company.—Mr. H. G. Ruggles was congratulated by the Chairman (Mr. R. Richmond) at the annual meeting of the Company, on the excellent results of his first year's work in the position of Secretary and Manager. Mr. Richmond added that they had expected a good year—in fact, they discussed at the outset of it whether the price of gas should be reduced. They felt, however, that such a step, at a time when the coal market was unsettled owing to labour troubles, might be a very unfair handicap to the new Manager. Accordingly, the Directors decided to await the balance-sheet. When they saw how excellent the figures were, they felt that there was no need for further delay, and carried their previous resolution into effect. The Company were rather proud of the way in which they had been able to reduce the price of gas time after time. The report announced that as from the 1st prox. the price would be reduced 2d. per 1000 cubic feet, bringing the net charge down to 2s. 10d. This reduction does not apply to the gas used for motive power, which is already charged at a special rate. The revenue account showed a balance of £2611; and with the carry-forward there was a balance of £3375 standing to the credit of profit and loss account. Dividends were recommended at the rate of 10 per cent. per annum on the original stock and 7 per cent. per annum on the new ordinary stock, also a bonus of 30s. per cent. on the original stock and 21s. per cent. on the new stock, less income-tax. This would leave a balance of £1324 to carry forward. At an extraordinary meeting subsequently, the Bill being promoted by the Company to extend their area of supply was approved.

Longwood Gas Company.—That the gross profit was the highest recorded in the history of this undertaking, was the gratifying statement made by the Chairman (Mr. Robert Thornton) at the annual meeting of the Longwood Gas Company. The quantity of gas sold during the year was 123 million cubic feet, which was an increase on the preceding twelve months of 3¾ million feet. The leakage was the lowest on record, which, he pointed out, reflected great credit on the management. After referring to the improved systems of lighting and heating by gas, he expressed the opinion that the Company was never on a sounder basis. Extensions in the near future were foreshadowed. A dividend of 3⅜ per cent., making with the interim dividend 5⅞ for

the year (the statutory amount), was declared; and subsequently the Bill providing for the transfer of the undertaking of the Slaithwaite Gas Company, and for other purposes, was approved.

Normanton Gas Company.—Excellent working results were announced by the Chairman (Mr. John Armitage) at the half-yearly meeting of this Company; an increased make of gas of 1,479,000 cubic feet, as compared with the corresponding period of the previous year, having been accomplished with the use of 76 tons less coal. An issue of more capital was foreshadowed, in order to reduce the bank-overdraft and to carry out improvements. Dividends of 6 per cent. on the original stock and 4½ per cent. on the additional stock for the half year were declared. The balance available for distribution was £4606.

Redhill Gas Company.—At the annual meeting of this Company last Wednesday, the Directors reported steady growth in the business, both in the sale of gas and the disposal of residuals. With the view of improving the position of the employees, and stimulating among them a greater interest in the Company's affairs, the Directors were inaugurating a co-partnership scheme, based upon the experience of other companies who have already proved the advantage of its adoption. [Particulars of the scheme have recently been given in the "JOURNAL."] In moving the adoption of the report, the Chairman (Mr. G. R. Hunt) stated that for the first nine months of the year the consumption of gas progressed very steadily; but the mild autumn reduced the increase. He was pleased, however, to be able to announce an increased sale of 3½ million cubic feet of gas, and to state that the present year had started satisfactorily. The carbonizing plant and automatic stoking machinery in the new retort-house were complete and in full work, so that the benefit of them would be felt in the current year's results. The Chairman concluded by giving the proprietors details of the co-partnership scheme. The report was adopted, and dividends at the rates of 10 and 5 per cent. per annum on the share capital and "B" stock (less income-tax) were declared; leaving £1178 to be carried forward. Thanks were accorded to the Directors, officers, and staff, and acknowledged by the Chairman, Mr. W. H. Bennett (the Engineer and Manager) and Mr. Horace Long (the Secretary).

Southend Gas Company.—The Chairman (Mr. C. F. Woosnam, J.P.), at the recent meeting of this Company, referred to the fact that there had been an increased sale of gas of 14 million cubic feet in the past half year. The sum received for gas was £2200 more. After meeting interest charges, &c., there was an amount available of £11,445; and when the dividend was paid, there would be £3008 to be carried forward. The report and accounts having been adopted, Mr. Burrows proposed a resolution empowering the Directors, until further notice, to apportion out of profits such sums as shall be equal to 5 per cent. per annum on stock acquired and held by members of the Employees' Stock Investment Society through the Society. He explained that the Society was formed in 1906, and by small deposits the members had been enabled to acquire stock in the Company of the nominal value of £1404. By this means, 51 employee stockholders had been created; and the Directors felt that some encouragement should be given to the movement. When the Society was formed, he promised that next time the Directors went to Parliament he would bring before the Board the desirability of getting some sanction to an addition being given to the sums the employees subscribed, by way of encouragement. This year they were promoting a Bill; but so far as they could find in the records of Parliament, up to the present time Parliament had done nothing for such societies as theirs. They had sanctioned co-partnership and other schemes; but none of the provisions touched their Society. The Directors, after carefully considering the matter, had decided not to put it in the Bill, but that he should approach the shareholders and ask them to vote the very small sum of money which would be necessary to add 5 per cent. to the investments. The resolution was passed unanimously; and at a subsequent special meeting the proprietors expressed approval of the Bill to extend the Company's limits of supply to authorize them to acquire the Southend Corporation's undertaking at Leigh, and for other purposes.

Sutton Gas Company.—An increase of 5½ million cubic feet in the consumption of gas during the past half year was reported by the Directors at the meeting of the Sutton Gas Company on Monday of last week. The profit and loss account showed an available balance of £6966, for which the Directors recommended payment of a dividend (under the sliding-scale) at the rate of 6 per cent. per annum, less income-tax, for the six months ended Dec. 31. The Directors expressed their "regret that Mr. Mead-Robins, owing to ill-health, has resigned his position as Secretary and Engineer to the Company—such resignation to take effect from Jan. 1, 1914." Mr. F. Budgen presided, and remarked that the shareholders must feel the balance-sheet was satisfactory. Referring to the resignation of Mr. Mead-Robins, he said, not only did the Directors much regret his ill-health, but they also regretted losing his services; and they did what they considered was right in the circumstances, and voted him six months' salary, amounting to £312 10s. Unfortunately, his health for some time past had been bad; and his attention to the business of the Company had been very much interfered with by the condition of things. The Directors felt, as they were able to pay their way and distribute the full statutory dividend, they were doing all that they were justified in doing in voting him the sum of money mentioned. Mr. F. J. Bancroft, after criticizing one or two items in the accounts, added that he considered the Company was in a very strong position, which reflected great credit on the management. He knew no other company near London which was in such a strong position. Mr. J. Ferguson Bell said it had been suggested to him by several shareholders, in reference to Mr. Mead-Robins's resignation after sixteen years' service, that some recognition should be offered him; and he therefore moved a resolution to the effect that the shareholders joined with the Directors in expressing their regret at the retirement of Mr. Mead-Robins in consequence of continued ill-health, and that in recognition of his sixteen years' service they grant him a retiring allowance of not less than £100 per annum and not more than sixteen-sixtieths of his average salary for the past five years, as from July 1 next. He hoped that, if passed by the shareholders, it would meet with the approval of the Board. He need hardly say it was not his desire to attack the policy of the Board, which, he felt, had the confidence of the shareholders; and he was glad to hear the graceful way in which the Chairman alluded to the services of the late Secretary. The name of Mead had been associated with the Company since its inception 60 years ago. Long and honourable had been the connection; and it was in consequence of this connection that he ventured to ask the Directors to support the resolution to give Mr. Mead-Robins a retiring allowance. Several stockholders had communicated with him on the subject. He had a letter from one, who, after referring to Mr. Mead-Robins' resignation, said: "I hope the Directors will generously acknowledge his long and faithful services by granting some substantial allowance." The Chairman said he could not accept the resolution, and ruled it out of order. He had taken the best advice he could on the subject. Both Mr. Bell and Mr. Bancroft expressed regret at the decision. The Chairman, however, reiterated that he could not accept the resolution.

Tonbridge Gas Company.—In moving the adoption of the report at the annual meeting of this Company on Monday last week, the Chairman (Mr. W. Judd) said the high price of coal had made the production of gas much more expensive than before; but the Company had come out all right, and were able to pay full dividends again. The increased consumption of gas for the twelve months was just over 5 million cubic feet, which came on top of 8½ millions in the previous year. The balance on the revenue account, which represented the profit for the year, was £4669; and the balance carried forward, after paying the dividends, was £5725. Reverting to the question of coal, the Chairman said the Directors were in communication with the Kent Collieries, with a view to the possibility of placing a contract with them in the near future. The report was adopted.

Tunbridge Wells Gas Company.—At the fiftieth annual general meeting of this Company last Friday, the Directors reported a satisfactory increase in the sale of gas, and recommended dividends at the rates of 13 per cent. on the ordinary stock, 10½ per cent. on the "B" stock, and 10 per cent. on the "C" and "D" stocks. This would absorb £6147, after deduction of income-tax, and leave £15,619 to be carried forward. The Chairman (Alderman W. H. Delves), in moving the adoption of the report, said the enormous increase which had taken place in the price of coal had considerably interfered with the profit. However, the Company were better off than some others, having had to draw upon their balance to only a very small extent. This was the only black point in the balance-sheet, as there had been a satisfactory increase in the sale of gas, despite the mild weather. Owing to higher freights and other causes, coal cost £1 0s. 4d. per ton last year, compared with 17s. 4d. per ton, which was the average for the previous twelve months. The capital account had been increased by £823, which, considering that the make of gas had gone up by 12 million cubic feet, was not large. The efficiency of the works had been well maintained, and they had not only made 12,000 cubic feet of gas per ton of coal, but had sold 11,500 cubic feet. The report was adopted. Mr. S. Spencer congratulated the Directors and staff on the excellent result of the year's working, and remarked that the fact that they sold 11,500 out of 12,000 cubic feet of gas per ton of coal showed that there was remarkably little leakage. Hearty votes of thanks were passed to the Directors and staff; and it was decided to send a sympathetic message to Mr. Andrew Dougall, the Company's Engineer and General Manager, who was prevented by an attack of influenza from attending the meeting.

Uxbridge Gas Company.—The Directors of this Company have been authorized by the shareholders to apply to the Board of Trade for a Provisional Order to enable them to raise additional capital not exceeding £100,000. This sanction was given at a special meeting, previous to which the report and accounts for the year ended Dec. 31 had been adopted at a general meeting. The report showed a net profit for the twelve months of £9724, which, added to the balance of £463 brought forward, gave a total of £10,187. Deducting from this £1539 for interest, there was left £8648 available for dividend. The Directors recommended the payment of 6⅛ per cent. on the consolidated stock, which would leave a balance of £259 to be carried forward. The Chairman (Mr. H. E. Jones) informed the proprietors that the business was growing at a rapid rate; the increased consumption in their new districts having been remarkable. The obsolete retort-house and plant had been replaced by an entirely modern installation. They had now the largest district of any gas company in the world—except that of Buenos Ayres, with which he had had to deal.

Whitby Gas Company.—Addressing the shareholders at the annual meeting of this Company, the Chairman (Mr. Freeman Richardson) said the receipts showed expansion; the sale of gas having increased by about 6 per cent. The total receipts for the year amounted to £10,113, as compared with £9774 for the preceding year. After payment of interest and the interim dividend, there was a balance of £1518, out of which it was decided to pay dividends at the rate of 3½ per cent. on the original capital and £2 9s. per cent. on the additional and new additional capital (both less income-tax) for the half year to Dec. 31—making, with the interim dividends paid for the first six months, 6½ per cent. and £4 11s. per cent. respectively for the year. A sum of £100 was placed to the renewal fund, and a balance of £347 carried forward.

Fatal Result of a Gas Explosion.—Mention was made last week of an explosion in a house at Silvertown, which resulted in the death of a boy who was standing outside in the street. At the inquest it was stated that the leakage of gas which caused the accident arose from an old water-slide chandelier, and that the gas might have accumulated between the ceiling and the floor of the room above, which was covered with linoleum. The pipes and meter were in perfect order.

CO-PARTNERSHIP AT NEWMARKET.

Reference was made by the Chairman (Mr. R. Stephenson, J.P., D.L.) at the annual meeting of the Newmarket Gas Company to the fact that during the past year the Directors have adopted a scheme of co-partnership for the employees; the objects being: (1) To give all officers and workmen an inducement beyond their salaries and wages to take an interest in their work, and in the prosperity and economical welfare of the Company. (2) To give them an opportunity of becoming shareholders in the Company, and thus, by becoming owners of property, to improve permanently their positions in life. (3) To encourage thrift and independence. (4) To give them a better prospect of regular employment. The employees have adopted the Directors' proposals unanimously; and there is every reason to believe that the scheme will work to the mutual advantage of the Company and their servants. It is subject to agreement and a set of rules; and the Directors reserve the right to cancel the scheme if it should be found to work unsatisfactorily. As a matter of fact, the arrangement—which is on the lines of that adopted at Cambridge—has been working some time, and the men are exceedingly pleased with it. Mr. J. H. Troughton (the Secretary and Engineer) explained the scheme to the proprietors. He said it was based on the men's wages. The bonus rose and fell in accordance with the price of gas. If the latter were 4s., the bonus would be 3½ per cent.; at 3s. 6d. (the present price), it was 5 per cent. In the event of the price of gas being reduced, the bonus went up by ½ per cent. for every 1d. of reduction below 3s. 6d.; so that at 3s. the bonus would be 8 per cent. The employees had thus an inducement to look after the Company's interests, and thereby get the price of gas reduced to the lowest possible figure. The scheme did not tie the men's hands, except that they signed-on for the year. But the Company had the power to dismiss; and the Directors would not stand in a man's way if he got a better job. If the dividend fell ¼ per cent., the men's bonus fell in in the same ratio. The men were not allowed to draw their bonuses until the sum reached £20; but after this they could draw out one-half, and also their percentage on the £20. If a man bought gas stock at £28 per £20 of stock, he would get 25s. a year in dividend. If a man chose to leave his money in the Company's hands, he would have 3 per cent. on it; and to encourage thrift they allowed him to add to it his savings, on which, also, they would pay 3 per cent. He thought it was a very fair and useful scheme, because if a workman got £20 saved he did not care about wasting it, though he might do so if he had a few shillings. Sixteen workmen had attended the Cambridge Gas Company's annual meeting who were shareholders.

The report of the Directors, which was adopted by the meeting, showed that the net balance of profit earned during the year ended Dec. 31 was £4808; while, deducting debenture interest and adding the amount brought forward, there was a sum of £8387 standing at the credit of profit and loss account. Dividends were recommended at the rate of 6¾ per cent. (less income-tax) for the year upon the original consolidated stock.

WEST BROMWICH GAS UNDERTAKING.

Committee's Appreciation of Mr. Copp.

In a report issued last Friday, the West Bromwich Gas Committee announce with regret the resignation of Mr. H. E. Copp, the Gas Engineer and Manager, who has been appointed to the position of Manager of the Potteries Station of the British Gaslight Company.

Mr. Copp, they state, was appointed by the Council in November, 1901; and since that time he has performed his duties in a highly capable manner. The efforts he has put forward will be of immense advantage to the undertaking in the future. They have accepted the resignation with regret: but, at the same time, they have congratulated Mr. Copp on his new appointment, and wish him every success. They are advertising for a successor to fill the vacancy; and they recommend the Council to approve the appointment of an engineer and manager to take charge of the manufacturing and distributing departments, &c., who will be required to devote his whole time to the duties of the position, and live in the borough, at a salary of £500 per annum.

The Committee further state that they have had under consideration a report of the Gas Engineer with reference to the supply of gas cookers and fires; and they recommend that consumers have the privilege of hiring these appliances at simple hire rates, in addition to the hire-purchase rates now in force.

LANCASTER CORPORATION GAS SUPPLY.

In presenting the estimates of the Lancaster Corporation Gas Committee at the meeting of the Lancaster Town Council last Wednesday, Sir Norval W. Helme, M.P., said he was glad to report that the sale of gas had increased, consequent on the reduction of price, to the extent of £608, and the residuals had produced £643 more than estimated. The net increase of expenditure over the estimate was £866; and deducting this from the increase of £1208, it left £343 above the estimated balance. Next year, owing to the meters having to be read twelve days earlier at the request of the Government Auditor, they expected to receive £600 less for gas, and to get about £7500 for coke and £4600 for tar, &c. The Committee expected to hand over £4000 to the relief of the rates, and to carry £279 to the reserve fund. The gas reserve fund stood at £3915 after £10,000 had been taken from it for working capital and improvements, including the erection of a new chimney to the retort-house, and the renewal of the retorts, which cost £5000. The estimates were approved.

Amlwch Gas Company, Limited.—This Company was registered on the 17th ult., with a capital of £10,000 in £1 shares (4000 preference). The offices are at No. 50, Cannon Street, E.C.

STOCKPORT GAS-WORKERS' DISPUTE.

At a meeting of the Stockport Trades and Labour Council last Thursday, a delegate of the municipal workers reported that the Emergency Committee of the Corporation had now agreed to meet a deputation of the gas workers at an early date this week, to discuss questions arising out of the recent strike settlement. The new unrest, as explained in the "JOURNAL" last week (p. 529), has arisen out of the alleged refusal of the Emergency Committee to meet the men; but the Chairman of the Gas Committee (Alderman Ferneley, J.P.) pointed out that the men had not even yet signed the terms of settlement, although they had been repeatedly asked to do so. This, he added, was the reason why the Gas Committee had not appointed their expert to consider the question of structural alterations at the gas-works.

Another delegate said he wished to give a flat denial to a statement made earlier in the week by Alderman Ferneley, that concessions amounting to £20,000 had already been granted to the men; and he moved that the Town Council be asked to indicate how these advances had been distributed. Subsequently a number of protests were raised against the increases of salary to officials; and it was finally decided to ask the Chairman of the Gas Committee to indicate, "for the information of the people," how the £20,000 referred to has been spent.

The opinion of the ratepayers of the borough (says our Manchester correspondent) is that the gas workers cannot hope to get all their demands satisfied unless they themselves carry out their obligations, and that it will not serve any good purpose for them to adopt an attitude of hostility towards the Corporation. They obtained very little public sympathy during the last strike, and are not likely to inspire confidence or respect by their present threatenings.

GAS AND WATER IN IRISH LOCAL TAXATION.

The annual report of the Irish Local Government Board, on "Local Taxation in Ireland," shows that the amount produced in 1913 by rates, in which is included about £107,661 raised in respect of water supplied for domestic and for other private purposes (3·1 per cent. of the whole amount so produced), represents an average of 4s. 3¾d. in the pound on the rateable valuation of Ireland at the beginning of the year, and an average of 15s. 9½d. per head of the population (4,384,710), as estimated in the middle of the year. The net expenditure from revenue amounted to £7,374,300, or, excluding gas, electric lighting, and tram undertakings in the hands of the municipal authorities, £6,523,371.

The municipal indebtedness includes £1,666,147 for water supplies, and £1,898,827 for purposes of lighting; while there is a total for sewerage of £1,116,442, of £1,095,440 for urban housing, and of £6,640,554 for rural housing. The amount standing to the credit of sinking funds applicable to the discharge of indebtedness repayable by such means stood at the close of the year at £1,187,372.

COAL GAS FOR DOMESTIC AND INDUSTRIAL PURPOSES.

A Popular Lecture in Glasgow.

Another of the series of popular lectures on the uses of gas for domestic and industrial purposes was delivered last week in the Partick district, by Mr. R. Halkett, the Commercial Superintendent of the Sales and Distribution Department of the Glasgow Corporation. The lecture was illustrated with numerous arc light views and cinematograph films. Bailie J. B. Paterson presided.

Mr. Halkett first dwelt on the necessity of adopting modern measures for retaining and maintaining good health. He referred to the present strenuous life a business man or woman has to live, and advocated any enterprise that would benefit the citizens from a hygienic and labour-saving stand-point—such as fresh air, sunlight, cleanliness, well-cooked food, and regularity of meals. The smoke nuisance and the evils of the domestic chimney came under the lecturer's observations. The use of gas served to abolish much of the smoke, and therefore cleared the atmosphere and admitted sunshine, which was the principal factor in introducing the comfort and the well-being of the citizens of many towns. The constitution of children was derived from their parents, and to-day they were more highly strung and nervous than the offspring of parents who, in days gone by, took life more steadily. But the increasing application for all sorts and conditions of gas appliances was confidently expected to bring about an improved physical condition.

When the Corporation took over the gas supply of Glasgow in 1869, the price of gas was 4s. 7d. per 1000 cubic feet; but it had steadily decreased until it was now 1s. 11d. This price compared favourably with coal. The benefits of gas as a lighting agent and a means of ventilation, and the advantages of gas hot-water circulators, gas-cookers, gas-fires, wash-house boilers, gas-furnaces, &c., were all brought under survey by the lecturer. He mentioned that the Glasgow Corporation had established a workshop containing the latest gas-furnace appliances, and manufacturers were invited to test them with their own material free of charge. A bright future was predicted for the gas furnace for annealing, case-hardening, tempering, metal melting, &c. On every hand gas appliances were being found by manufacturers to be more efficient and labour-saving. The efforts of the Corporation had met with great success in the past, and he looked to the future to bring even greater results, and to the time when they would breathe city air unpolluted with smoke, and have blue skies and as much sunshine as they found when they went annually to the country or seaside in search of these essentials of health.

At the close of the lecture Bailie Paxton, late Convener of the Gas Committee, paid tribute to Mr. Halkett's abilities in moving a vote of thanks, which was cordially endorsed by the large audience.

There was an exhibition of gas appliances, and a demonstration of cooking by two lady experts, who, among other things, cooked a six-course dinner at a cost of a little less than 1d. for gas.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

At a meeting of the Edinburgh and Leith Corporation Gas Commissioners, further correspondence between the Edinburgh and Leith Master Plumbers' Association and the Clerk was considered, and Mr. Masterton's suggestions were agreed to regarding the extra ½d. per foot for ¾-inch pipe and 1d. for 1-inch pipe; and where the number of joinings at the meter end exceeds four, an extra 3d. per joint to be granted. In regard to water-heating appliances where the plumbing work is of any magnitude, estimates are to be taken from the traders. They also had before them a report by Mr. Herring and Mr. Masterton on the question of high-pressure gas for public lighting, and considered that the Commissioners would be safe in offering to supply an installation of high-pressure gas-lamps, each of a guaranteed 600-candle power, including lighting, extinguishing, and maintenance, for the sum of £7 per lamp per annum used under the same conditions as the present electrical installation, which averages £9 per lamp. When the public lighting was tested by independent experts some time ago, it was found that the arc electric lamps did not average the candle power now offered and guaranteed by the Commissioners; and this has been verified recently. They referred to a number of thoroughfares in London where high-pressure gas-lamps have supplanted electric arc lamps—such as in Whitehall, Victoria Street, Pall Mall, Regent Street, St. James' District, Westminster, Cannon Street, Queen Victoria Street, Lower Thames Street, New Bridge Street, Kingsway—and also that in the City of Berlin there are 37¼ miles of streets lighted by high-pressure gas, and over 43½ additional miles are to be so lighted. The Engineer was instructed to get into communication with the Corporations of Edinburgh and Leith.

The question of the adoption of the Burghs Gas Supply (Scotland) Act was before the Town Council of Kinross before the last November election, and a special meeting has been held to consider the final decision, when Provost Alles presided. The Chairman of the Kinross and Milnathort Gaslight Company, Mr. Ross, said that the Company had expected that Mr. Yuill would have submitted a report to the Council; but the Clerk pointed out that he had been unable to do so, as he could not get the required information from the Gas Company. A motion was made that the Act should not be adopted; but the counter motion that it should be adopted, and apply to the Burgh, was voted upon and carried. It was said that it had been pointed out to the Council that they could not afford to pay more than £9000 for the works, and even then only small profits might be obtained. The matter will no doubt move forward, and be fought out between the parties in the usual way.

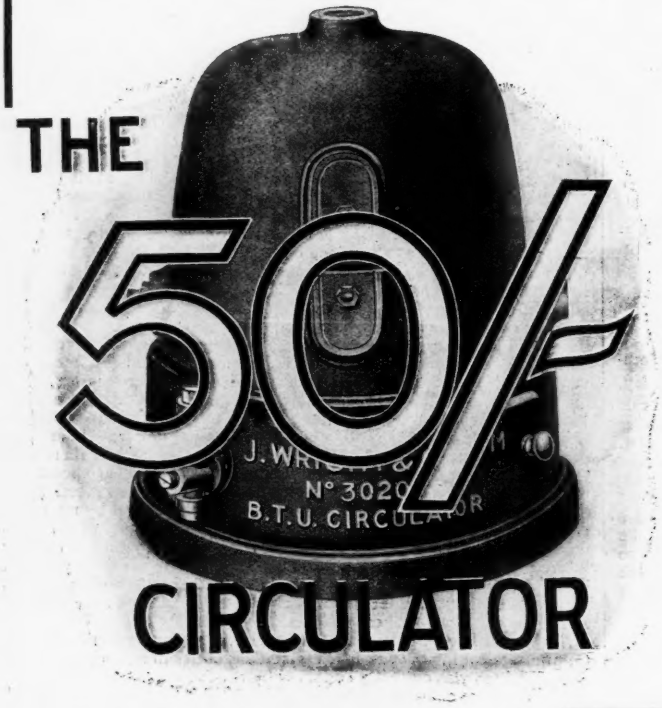
Mr. H. G. Cree delivered a lecture, under the auspices of the Glasgow and West of Scotland Branch of the Smoke Abatement League, and he referred to the backing the Gas and Electricity Departments had given to the League, in trying to reduce the pollution of the air by smoke; and he claimed that this had improved the Glasgow fogs. More than four houses out of every five in the city now had gas-cookers on loan from the Corporation, and about 30,000 gas-fires, &c., were on hire or hire purchase. He referred to the anthracite stoves, but did not say that, while these were economical of fuel, they were giving out the wrong kind of heat, and preventing the chimney acting as a ventilator to change the air of rooms. He also referred to the sale of coke in small quantities (which was mentioned in this column a few weeks back), and thought the Corporation should publicly demonstrate how suitable a mixture of coal and coke was for kitchen use. He appealed to the better class citizens to let their chimneys be an example to those of the less well to do.

At the meeting of the Glasgow and West of Scotland Master Plumbers' Association, the Directors report contained a reference to the opposition put forward by that body, in conjunction with the Ironmongers' and Allied Trades Association, against the proposal of the Gas Department of the Glasgow Corporation regarding the hiring of lamps for the fronts of shops and warehouses, and satisfaction was expressed that the Corporation had declined to pass the minute recommending this adoption.

There appears to have been a wakening-up on the part of electrical apparatus supply firms, and a determination to try and obtain the lighting of a number of towns in the North of Scotland. The latest place proposed is Elgin, where the Convener of the Lighting Committee has been looking into the question of the gas supply. He has been struck by the figures which presented themselves to him, and in consequence thought that something could be done in the way of introducing electric light, and that this would be cheaper than an extension of the gas-works. The electric lighting scheme he considered would cost about £7000. In view of the fact that the total loan capital is only £27,000 (of which, by the way, about £12,000 has been repaid), it would appear that for much less than £7000 a considerable extension of the gas-works would be possible. It seems surprising that the Convener of the Lighting Committee did not take an earlier opportunity of looking into the accounts of the Gas Department, when he might have found that an expenditure of a smaller amount would have ensured all that was necessary in the way of a satisfactory gas supply, which would have been cheaper than any system of electric light could be. It is evident that the gas companies and the gas departments of corporations in the North of Scotland will have to combine, and, by means of circulars, advertisements, and popular lectures—such as were given at the Edinburgh Gas Exhibition—inform the public of these Northern towns of the advantages of the cheapness and superiority of gas over electricity.

The amount to be handed over this year to the borough fund by the Lancaster Corporation Water Committee is £5056, against an estimate of £4476.

TWO THINGS we would Emphasise.



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BIRMINGHAM.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

During the past week there have been many inquiries for pitch, and the price is 39s. 6d. to 40s. net; the latter figure having been offered for this season and declined by a maker. Creosote remains at 3¾d.; 90-160 solvent naphtha, 10¾d. net and naked; 90-120 toluol, 1s. net and naked; 90 per cent. benzol, 1s. 2d. net and naked; 60's crude carbolic acid, buyers at 1s. 1d. to 1s. 1½d. net casks free; pyridine, 8s. 3d. net per gallon filled into buyers' drums.

Sulphate of ammonia continues at £12 buyers and £12 2s. 6d. sellers for 25 per cent. minimum quality, net and naked at makers' works.

Manchester Tar Prices.

It is officially announced that the average price realized for January deliveries of tar in the Manchester district—based on the value of the products—was 33s. per ton.

Tar and Tar Products in the Provinces.

The average values during the week were: Tar, 26s. 3d. to 30s. 3d. Pitch, east coast, 38s. to 39s.; west coast, Manchester, 37s. 6d. to 37s. 9d.; Liverpool, 38s. to 38s. 3d.; Clyde, 37s. 6d. to 38s. 6d. Benzol, 90 per cent., naked, North, 11¼d. to 11¾d.; 50-90 per cent., naked, North, 11d. Toluol, naked, North, 10¾d. to 11d. Crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 9¼d. to 9¾d. f.o.b. Heavy naphtha, naked, North, 9d. to 9½d. f.o.b. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, 3⅞d. to 4d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 0¼d. to 1s. 1d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1¼d. to 1¾d.; "B," nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *Feb.* 28.

Owing to the lack of much support from any quarter, the market for this material has had a drooping tendency throughout the week. With the completion of covering February shipments, the tone has become dull, and buyers have shown little disposition to contract for March supplies. The closing quotations are £12 8s. 9d. per ton f.o.b. Hull, £12 10s. per ton f.o.b. Liverpool, and £12 11s. 3d. per ton f.o.b. Leith. The forward position has also been rather quiet, but it is reported that makers have recently obtained, in two or three directions, £12 5s. per ton f.o.b. best ports for July-December delivery in equal monthly quantities.

Nitrate of Soda.

This market is again firmer, and spot quotations have been advanced to 10s. 7½d. per cwt. for ordinary, and 10s. 10½d. for refined, quality.

From another source it is reported that the market for sulphate of ammonia has been quiet during the past week; but prices have remained about the same. Outside London, makes are quoted at £11 17s. 6d.; Hull, £12 10s.; Liverpool, £12 10s. to £12 11s. 3d.; Leith, £12 12s. 6d.; Middlesbrough, £12 10s.

The New Issue of Bournemouth Company's Capital.—At the sale by Messrs. A. & W. Richards, at the Mart, Tokenhouse Yard, E.C., last Tuesday, of the new issue of 2000 preference £10 shares (6 per cent.) of the Bournemouth Gas and Water Company announced in our advertisement columns, a total of £26,795 6s. 3d. was realized; the prices ranging from £13 5s. to £13 15s. per share.

Lurgan Gas Bill to be Opposed.—A meeting of the ratepayers of Lurgan last week adopted a resolution approving of the Council's opposition to the Bill promoted by the Lurgan Gas Company for the extension of works and the manufacture of electricity. Mr. Donnelly said the Council would be guilty of a gross dereliction of duty if they allowed any private company to create a monopoly in the lighting of the town. Mr. M. Thompson, one of the Councillors, advocated the purchase by the town of the Company's plant and premises. The Chairman of the Urban District Council said consumers had been complaining both as to the price and quality of the gas supplied; but it did not follow that this was due to bad management. On the contrary, it could be proved that the Company's management was very good indeed. The yearly balance-sheet showed this.

Universities as Trainers for Business.—At the first annual dinner of the Optimists' Club last week, an address was delivered by Mr. H. Gordon Selfridge, who emphasized the value of optimism as compared with pessimism. He said the former was so closely related to success, and business was so intensely fascinating in its ramifications, that it seemed to him that optimism and business should unite in a partnership that could not be dissolved. One of the speakers on the occasion was Mr. F. W. Goodenough, who drew attention to the want of recognition at the Universities of the necessity for scientific training for business. There was, he said, no evidence really worthy of mention in the ancient Universities in this country of the fact that business existed at all in the world outside. When we had imported another American idea into this country—viz., that of having business sides to our Universities, where a man could gain some knowledge of what business organization meant and entailed—then business would have a better recognition. His remarks were received with cheers.

THE MAIN COOKER SEASON:

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Are you considering the adoption of a Series of Cookers or of a Single Cooker that will be profitable and suitable for your local requirements?

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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade is steadier, and the settlement of the large contracts for the Swedish State Railways has resulted in some large orders for north-country coal at lower figures. Possibly 160,000 tons will be contracted for locally, and the basis of price is 16s. 11d. per ton for best steams at Stockholm, or possibly equal to 12s. 6d. per ton f.o.b., which is perhaps 1s. per ton below the current quotation. Shipments of coal are fairly good for this season; but forward prices are easier, and the decision in the large contracts that are mentioned above may help in this direction. Gas coal is generally rather firmer at present. For best Durhams, the current quotation is from 13s. 4d. to 13s. 6d. per ton f.o.b.; and seconds are about 12s. per ton. For "Wear specials," the price is round about 13s. 6d. per ton, with a fair demand. One or two small contracts are reported; but they show little change in prices, and do not have much influence on the market. As to the German coal for London, the supposition is now made that coal will be brought to the Thames, possibly to the extent of a quarter-of-a-million tons, and that the steamers that bring it may in some degree take back gas coke from London to Rotterdam, which seems in some measure feasible. Nothing more is known as to the prices. Gas coke is in rather lessened production, and may be quoted from 13s. 6d. to 14s. per ton f.o.b. in the Tyne.

Liverpool Street Lighting.

It is stated by Mr. A. G. Smith (the Liverpool Corporation Lighting Engineer), in his annual report, that there are 19 883 gas-lamps in the city, an increase of 130 lamps compared with 1912; but in addition there are 433 lamps taken over in the recently-added four districts of Allerton, Childwall, and Little and Much Woolton—making a total increase on the year of 563. Besides the automatic system, 90 men are employed as lighters; an average of 112 lamps being dealt with by each man. The total length of roads lighted at the end of the year, including the newly-added areas but irrespective of courts and passages, amounted to 499¾ miles; 8 being by electricity, 475¾ by incandescent gas, 11 by flat-flame burners, and 5 by oil. The total charges in connection with the public lighting of the city and the supervision of the gas supply for the year amounted to £54,678. A revenue of £3395 has been derived from work charged to other departments and bodies, including a large portion of the gas-fitting work of the Corporation, which last year was again heavy. The net expenditure was, therefore, £51,283.

The Gas-Works Committee of the Halifax Town Council have decided to recommend that the salary of the Gas Engineer (Mr. W. B. M'Lusky) be advanced by £100 per annum as from the 1st prox.

Burnley and Padiham Amalgamation Proposals.

The latest amalgamation proposal, so far as East Lancashire is concerned, is that of Burnley and its neighbour, Padiham. Notice has already been given of a resolution to be moved at the next meeting of the Padiham Council, that representations be made to Burnley with a view to amalgamation, and the matter is expected to be thoroughly thrashed out. In the course of an interview, Councillor Wiggins, a prominent member of the Padiham Council, pointed out that amalgamation would not operate solely in Padiham's interest. The Padiham Water-Works could be made into a valuable asset for Burnley. Padiham, he added, has a lease of gathering grounds, which expires in about four years; and if they did not build the service reservoir which they were under obligation to do, they would lose it, and it would entail an expenditure of £20,000 or £30,000 to meet the situation. Mr. Wiggins also pointed out that, at the present time, water represented 11d. on the local rates; but if Burnley got hold of the scheme, it need not stop at £30,000. They could utilize all the gathering grounds they could get hold of, and provide a valuable area with better water than they could hope to obtain from other districts. Pendle water, he concluded, was celebrated for its purity; and by amalgamation they could work a valuable water scheme for Burnley.

Water Supply for Fire Extinction in London.

At the meeting of the London County Council last Tuesday, the report of the Fire Brigade Committee on the above subject, to which reference was made in the "JOURNAL" for the 10th ult. (p. 379), was received. The Committee recommended: "That steps be taken with a view to a further conference between representatives of the Council and of the Metropolitan Water Board relative to the questions outstanding between the Council and the Board as to the supply of water for fire-extinction purposes; the conference to be held on the basis that neither the Council nor the Board is responsible legally for the provision of an adequate supply in places where the existing supply is insufficient, but that it is desirable that a settlement by consent should be arrived at in the matter." Mr. J D. Gilbert moved that the recommendation should be referred back to the Committee. He said the Council had had several conferences with the Board, and they had been useless. The only way in which the view of the Council on the question could prevail was for them to go to Parliament and insist on the Board supplying free all water required for the extinction of fires. He moved the reference back in order that the Committee might bring up a resolution that the Council should go to Parliament and state their case, and let Parliament decide whether their contention or that of the Water Board was right. Mr. Edward Smith, in seconding the motion, submitted that Parliament intended it to be an obligation upon the water authority for the Metropolis to provide the water necessary for fire extinction. The further discussion of the subject was postponed until the next meeting.

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"IT has exceeded my expectations. It is "indeed a splendid arrangement for "giving a continual supply of hot water, "both upstairs and down, at small cost. It "has proved so EFFECTIVE AND ECO-"NOMICAL that I have now DECIDED TO "DO WITHOUT COAL ALTOGETHER."

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Burnley Gas Workers' Demands.

The Burnley Gas Committee on Thursday decided not to concede the further increase in wages demanded by various sections of the Corporation gas workers (see *ante*, pp. 246, 314). These demands were presented by the Burnley branch of the National Gas Workers' Union, and amounted, roughly, to about £2300 a year—equivalent to a 1½d. rate. It was felt impossible, in view of the official explanation that the "financial results of the Gas Department during the present financial year were much below expectations," to grant this amount; but in the end the Committee met the men generously, and conceded advances aggregating to about £1000 a year. The men replied that they wanted 6½d. per hour for labourers, as against the 6¼d. offered, besides asking the Committee to reconsider several questions of a minor nature in respect of other grades of workmen. A communication from the National Union of Gas Workers and General Labourers embodying these demands was, as stated, laid before the Gas Committee on Thursday; but the Committee agreed to adhere to their former decision.

Auto-Lighter Limited.

Arrangements have recently been concluded by Auto-Lighter Limited with the Gas-Meter Company, Limited, under which the latter Company will exploit in the United Kingdom and elsewhere, under a sole and exclusive licence, and in accordance with the patent relating thereto, the two systems of automatic lamp lighting named the "Automaton" controller (pressure system) and the "London" controller (clock system). It will be recalled that the "London" controller was fully described and illustrated in our issue of Aug. 19 last. The excellence of the clock movement, together with its compactness, simplicity, and certainty of action, are gaining general appreciation; and opportunity may shortly be taken to illustrate this controller as adapted to extinguish one or more burners of a cluster at any given hour. The various installations of the "London" controller are also giving great satisfaction; and it is found that the ease and accuracy with which it can be set, the fact that the apparatus is insect and dust proof, and the ingenious gas-tap which provides for the pilot being automatically extinguished when the full flame is lighted, are among the special features particularly attractive to gas lighting authorities.

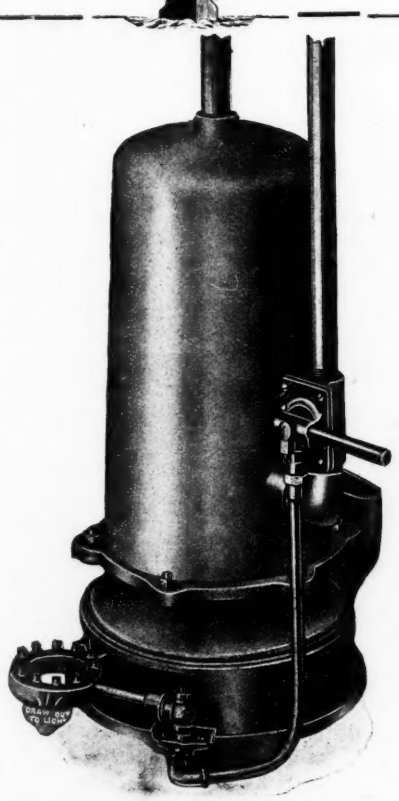
Leighton Buzzard Gas Purchase Scheme.—Referring to the proposed purchase of the undertaking of the Gas Company (which has now been perforce put off, for a time at least), the local "Observer" says that the "rejection of the Leighton Buzzard Urban District Council's Bill has been received by thoughtful ratepayers generally with unalloyed relief. They realized that the transaction was the most gigantic ever contemplated in the history of the town; and while they were not unwilling to consider it—many even welcomed it—they were alarmed at the speed with which the town was being committed to an unknown outlay."

Cromer Water Supply.

The Cromer Urban District Council recently paid an official visit of inspection to the installation of Candy filters which they have recently put down at their pumping station at Metton, in order to remove the iron which exists in the water as it is pumped from the well. The filter plant consists of four 9-feet diameter oxidizing filters of the compound or double-bed and double-scour type, tested to 160 lbs. hydraulic pressure. The filters are constructed of Siemens best mild steel; and they deal with the water at a rate of 40,000 gallons per hour. The water on entering the pressure filters is aërated under compression, and passes through the coarse filter bed so as to break up the air. Then it passes through the fine filter bed, composed of sand and the special oxidizing material "Polarite," which completes the purification of the water and the removal of the iron. When it is required to cleanse the filters, the flow of water through them is reversed; a revolving hydraulic double scouring arm is put into operation; and the iron (which has been oxidized and arrested by the filters) is washed away—the washing process occupying but a few minutes.

Willesden Public Lighting.

At the last meeting of the Willesden Urban District Council, the Lighting Committee reported having had under consideration a report of the Borough Engineer as to the terms upon which the Gaslight and Coke Company are prepared to undertake the lighting of street-lamps. In October last, the Committee state, the Council decided to enter into a contract with the Company, whereby they are to provide and fix new inverted burners and "Nico" lanterns, supply gas-mantles, and undertake all repairs and painting work, for a period of five years; the Council having the option to renew such contract for a further period of five years. The terms of the original proposal provided for the payment by the Council during the first five years of the contract of the capital charges in respect of the replacement by the Company of the existing lanterns with new ones suitable for inverted burners; the additional annual cost thus involved being £1642. In the event of the contract being renewed for a further period of five years, a saving of £241 would be effected. As the result of negotiations by the Engineer, and with a view to an equation of the foregoing figures, the Company are now prepared to spread the capital charges over a period of ten years, instead of five years as originally arranged; thus reducing the annual cost from £1642 to £700. Should the Council decide not to renew the contract at the end of five years, the balance of the capital charges then outstanding will be repayable to the Company at the rate of 7s. per lamp per annum for the following five years; the lamps then being, of course, available for any other method of lighting which may be adopted. Having given the matter most careful consideration, the Committee have decided to accept the amended offer of the Company for five years.



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WARRINGTON AND LONDON.

The Price of Incandescent Mantles.

In the "JOURNAL" for the 27th of January we reproduced from the "Ironmonger" some remarks to the effect that the price of at least the lower-grade gas-mantles was to be raised against the dealer. This decision was due to an understanding come to between the British and Continental makers. It is stated in a paragraph which appeared in our contemporary last Saturday, that, following the meeting held in January, about seventy manufacturers met in conference in Berlin, on the 13th and 14th ult., and after their return the British firms were called together on the 23rd. As the result of these meetings, an International Convention of Mantle Makers has been established, and it was decided to increase the price as from the 2nd of March. The "Ironmonger" says: "It is not proposed to raise the prices so high as to affect the consumer; and most probably mantles of repute will continue to be bought and sold at or near the present rates. On the other hand, the cheaper grades, which have been purchased by dealers without any concern as to quality, and distributed by them with even less regard to their own reputation or to the interests of the gas industry, are likely to be from 2s. to 4s. per gross dearer. As practically the whole of the production is covered by the arrangements, mantles at 12s. a gross or thereabouts—mantles which have been a bane to the whole trade—will disappear. There ought also to be a raising of quality alongside this stiffening of prices; and it is hoped that a more healthy tone will prevail in the trade than has been the case for a long time past."

A Manager's Gallant Rescue.—Mr. Arthur Heap, Manager of the West Cumberland Bye-Product Works at Flimby, effected a gallant rescue last Thursday. A mechanic named M'Arthur was gassed inside a tar-still he was repairing. A foreman and a labourer went down to the rescue, and were soon overcome by the sulphuretted hydrogen. Mr. Heap then tied a rope round his waist and descended. He stood the fumes better than the others, and though drawn up once for air, and always on the verge of collapse and often half-unconscious, he stuck bravely to his task, and succeeded in getting the men roped so that they could be hauled out. All three had a narrow escape, and M'Arthur was unconscious for three hours.

Loans for Sidmouth Gas Extensions.—The Sidmouth Urban District Council further discussed last Friday the report of the Gas Committee, who recommended that the sanction of the Local Government Board should be obtained for the borrowing of £2465 to defray the cost of 400 prepayment installations, £1625 for the extension of the gas-works, and £1000 for erecting a refuse destructor at the gas-works. Mr. Halse, in moving the adoption of the report, emphasized the great value of the scheme submitted by the Committee. He said the extension of the prepayment installations would benefit the working classes of the town, and it would cost an average of about £6 to take the gas into each house. The report was adopted.

Reduction in Price at Malvern.—The Malvern Urban District Council, on receiving from their Engineer and Manager (Mr. W. H. Johns) a report on automatic lamp controllers, have given him authority to fit up 115 lamps—that is, one round—on the Horstmann system. They are also (subject to confirmation by the Council) joining the British Commercial Gas Association. Further, they have decided to reduce the price of gas by 2d. per 1000 cubic feet from next quarter.

Proposed Lighting of Bitterne.—The village of Bitterne (Southampton) will not at present adopt the Lighting and Watching Act. This is the result of a poll which followed on much argument. Two schemes were put forward—by the Southampton Gas Company and the Electricity Committee; the latter being favoured by the Council. There are 662 voters; and those who went to the poll voted as follows: For the adoption of the Act, 138; against, 201; majority against, 63.

Burnley Gas-Works Results.—Things have not gone on so well as was anticipated during the past municipal year at the Burnley Corporation Gas-Works. At the beginning it was estimated that the Gas Committee would be able to contribute £9000 to the relief of the rates; but, owing to unforeseen circumstances, it is likely the amount will not be much more than £2000—the difference being equal to a 4d. rate. Owing to the coal strike early in the year, there was a general resort to the use of oil, the price of which rose considerably, putting up the costs of the department. The consumption of gas has not shown so large an increase as was expected owing to short time and other economies; while residuals and other saleable products had not realized the price expected, owing to a drop in the market.

Municipal Trading at Bradford.—Considerable discussion took place, at a recent meeting of the Council of the Bradford Chamber of Trade, in respect to new proposals of the Bradford Corporation for extending their municipal trading undertakings. The matter arose out of a letter from Messrs. Taylor and Parsons, who asked that a strong protest should be sent from the Chamber to the city authorities against the proposal of the Corporation to open a large shop in Darley Street, the principal shopping thoroughfare of the city, for the purpose of displaying 200 models of gas cookers and heaters and appliances of every description, and trading in these things. The Secretary of the Chamber (Mr. F. Pickering) reported that he had received protests against the proposal from members of various trades who had premises in the street, and who objected on the ground that the depôt would not be in keeping with the general character of the shops. Mr. T. Pratt moved that a strong protest should be sent from the Chamber, and said the development of municipal trading had already gone too far. It was time the traders showed the Corporation that they would not have any more of this kind of thing, and that if the authorities were going to spread their schemes of trading with ratepayers' money in competition with the ratepayers themselves, the traders should refuse to pay their rates. Expressions of disapproval were voiced by representatives of various trades; and it was unanimously resolved that a strong letter of protest should be sent to the authorities.

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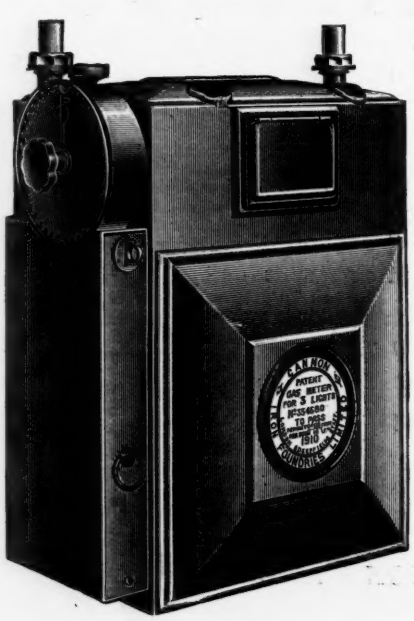

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Blackburn Gas Strike Aftermath.—The Special Sub-Committee of the Blackburn Corporation which has had charge of the municipal employees' strike on Tuesday last published the second list of expenses incurred in keeping the gas-works going—bringing up the total so far to £7350. This includes £1354 for wages; food, £767; refreshments, £113; taxi-cabs, £86; and flashlights, £13. Lively scenes were witnessed the same evening at a mass meeting of the members of the local Industrial Co-Operative Society held "to consider the conduct of the Committee in refusing to supply food to over a hundred county police officers imported during the strike." A resolution of censure on the Committee was moved; but, after a hot debate, it was rejected. The main argument of the opposition was that the Committee had no right to refuse business worth £140 a week. The Committee's reply was that they thought it was wiser to preserve a neutral attitude during the strike.

Quality of the Gas at Macclesfield.—Following on some criticism in the Town Council of the quality of the gas now being supplied, there was some plain speaking at the meeting of the Macclesfield Gas Committee some days ago. Alderman Isherwood (the Chairman of the Committee) expressed his readiness to resign, if he was not thought to be speaking the truth; and the Engineer (Mr. W. Newbigging), according to the local "Courier," followed by saying that when the work he had now in hand was finished, there would be an end to his connection with the undertaking. He warmly defended the quality of the gas, and spoke of the sacrifices Messrs. West had made in the matter of the breakdown of the new plant—declaring that they were as anxious as he was to leave the works in good order. During the meeting, Mr. Newbigging was asked to reconsider the matter of his resignation; but he declined to do so. After the business had been concluded, these appeals were repeated, both to Mr. Newbigging and to Alderman Isherwood. What the final result will be is a matter of conjecture.

Fatality at the Huddersfield Gas-Works.—An inquest was held last Wednesday at Huddersfield on Francis Saville (aged 40), a labourer, of Huddersfield, who was killed instantly at the Corporation Gas-Works the previous Monday by a fall of 4 cwt. of hardened sulphate of ammonia which he and other labourers had been undermining. A workmate with the deceased, a man named John Lancaster, said that to reach the soft sulphate of ammonia they had to work with pick and shovel from the base of the stack; but when the inevitable fall was likely to occur, no one could tell. On this occasion, fully 2 tons of the material fell, breaking as it came down, and a portion burying Saville. The foreman, Henry Morris, who said he had been employed on the works for 27 years, said the process had always been the same. In the three years he had been foreman, four non-fatal accidents had occurred. Mr. Edward A. Harman, M.Inst.C.E., the Engineer and Manager of the Gas Department, said that the Gas Committee were anticipating the early delivery of a hydro-extractor, which would in future obviate the necessity of undermining the stacks. The Jury returned a verdict of "Accidental death."

Explosion under a Train.—An explosion of an extraordinary nature took place last Saturday morning just outside Plaistow Railway Station, as the result of which passengers in an express train from Southend to Fenchurch Street had a rather rude shock. Close to the London, Tilbury, and Southend lines run a number of the Gas Light and Coke Company's mains, and as the train passed the spot a loud report was heard, and stones and earth were hurled into the air. The whole of the train had not passed when the explosion took place, and in consequence some of the windows were broken by the *débris*. It is presumed that there had been a leakage of gas, and that a spark from the engine caused the explosion. Traffic was suspended for some time while the workmen repaired the damage.

Gas Power in Mills.—A further step in the exhaustive investigation which is being conducted by the Mill Driving Committee of the Textile Institute upon the subject of textile mill driving was taken in Manchester last week, when the question of steel-belt power transmission was considered. In the earlier stages of the investigation attention was chiefly directed to prime-movers—gas, oil, steam, and electricity [see "JOURNAL" for May 13 last, p. 462]; but recently the advantages claimed for chain-driving were discussed, while in the near future it is probable that rope-driving will be considered. The Mill Driving Committee intend dealing thoroughly with the subject, and have decided that a series of questions relating to methods of driving textile mills shall be prepared for submission to those in charge of various types of factories.

Coventry Gas Supply.—New plant and equipment in connection with the Coventry Corporation gas undertaking is being provided at a total estimated outlay of £7635; the cost being paid out of revenue. It is as follows: Additional coke-breaking machinery, to meet the increased demand for coke, £1235; additional storage tank for tar and liquor, of a capacity of 842,000 gallons, £5250; new workshops and stores for gas-fitters, total cost £2750, towards which about £2100 is in hand, balance to be provided £650; dehydrating plant for tar, so as to make the tar suitable for the tar-spraying of roads and for the manufacture of tar macadam, £500. The Gas Committee have considered the question of arranging for an exhibition of domestic gas appliances in connection with the "Ideal Home Exhibition" to be held in Coventry next October, and resolved that the Chairman and the Vice-Chairman be authorized to deal with the matter.

Messrs. D. Harper and Co., of 258, Holloway Road, N., are now publishing the 1915 edition of their purse and vest-pocket calendar. These form a suitable advertising souvenir for gas undertakings to send out to their consumers. The name of the company can be stamped in gold on the cover; and the diminutive book is nicely enough got up to ensure it being respected. The last edition of the calendar was supplied to a number of the leading gas companies and corporations; and for 1915 others also may like to take advantage of so dainty an advertising medium.

QUALITY TALKS!

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The contract for the repair of gas-meters in the London County Council schools, held by Messrs. Parkinson and W. & B. Cowan, Limited, since 1892, was terminated on Dec. 9, 1913, and new tenders for the work were invited. These were received from three firms in addition to the one named above, and in all of them 10 per cent. above the schedule prices was specified. At the meeting of the Council to-day, the Education Committee will recommend the acceptance of the tender of Messrs. Parkinson and W. & B. Cowan; the contract to be for three years, from the 16th prox. The Committee in their report say they are advised that during the tenure of the previous contract the firm "executed the work in a satisfactory manner."

The following appeared under the heading "Brevities" in the "Ironmonger" last Saturday: "In the course of a discussion on the subject of cooking by gas and electricity, a speaker pointed out that the earliest experiments in gas cooking took place as far back as the year 1700, and were carried out in a ditch about two miles from Wigan. There was, he said, an exudation of natural gas in the ditch, and as the gas rose to the surface of the water, the natives ignited it and succeeded in boiling eggs in the flames. This statement, like the eggs, will be the better for a pinch of salt. The gas would, of course, bubble to the surface of the water, and, unless means were taken for collecting it, could not be ignited. The reports of the period stated that 'the water burnt like brandy,' which seems to show that it was not gas that the people were experimenting with, but probably paraffin oil or spirit, exuded from some of the bituminous coal seams which abound in the neighbourhood of Wigan."

The Directors and employees of the Newport (Mon.) Gas Company were complimented in the course of a speech by the Mayor (Dr. J. Lloyd Davies, J.P.), on the occasion of the annual dinner of the Newport Gas-Works Benefit Society. He congratulated the Directors on the success of their undertaking, and added that the gas workers, with the railway men of the town, were the best type of workmen in the district. Alderman Thomas Canning, who presided, referring to a suggested decrease in the price of gas, pointed out that a reduction of even 1d. per 1000 cubic feet meant a large falling off in the revenue of the Company. The toast of the Society was responded to by Mr. J. Whitefield, who has been its Secretary for 39 years.

An enjoyable smoking concert, arranged by the Glasgow Corporation Gas Department Foremen's Association, took place last Friday week; those present numbering about 140. The President (Mr. G. Scott) occupied the chair; and he was supported by the Convener of the Gas Committee (Bailie Irwin), the General Manager (Mr. Alex. Wilson), the Commercial Superintendent (Mr. R. Halkett), the Workshops Superintendent (Mr. J. M'Ghee), and others. The President said that the aims of the Society (which was only just emerging from the chrysalis state) included mutual help, protection, and improvement; and he desired to acknowledge the instant and friendly recognition of the Association by the Gas Committee and the General Manager. Bailie Irwin expressed his opinion that the Association had already justified its existence. Mr. Wilson said a parade of all the foremen would be a good thing, as it was in the ordinary course of things quite impossible to get in touch with each one.

GAS COMPANIES IN THE STOCK EXCHANGE.

The Stock Exchange has had a dull week on the whole. It was free from any violent perturbation; but business was very ill, and there was a lack of heart in it—the public still standing aloof. The old disquieting factors at home and abroad were in evidence during the greater part of the time; but symptoms of improved feeling began at last to manifest themselves, and, after some oscillations, markets closed decidedly stronger. Consols, after a loss, regained their starting figures; but the rest of the chief markets were not quite so fortunate. The opening day was far from encouraging. Apart from domestic politics, affairs in France, Mexico, and the Brazils exerted a depressing influence. Government issues generally were flat, though Consols held tight. Rails were lower with scarcely an exception, and American weakened. Tuesday was a dull day, with hardly anything to do but to make arrangements for the settlement. Gilt-edged showed further weakness, and Consols dropped $\frac{1}{4}$. Rails, Americans, and Colonials were down, but Foreign showed some better points. Wednesday brought no sign of improvement. Government issues were quite out of favour; and all the rest were more or less depressed. On Thursday, after an unpromising start, an improvement set in, and before the close a fair recovery had been effected in several lines, but not throughout the list. Government issues were stronger, though Consols did not move. Rails also participated; and some good buying hoisted Transatlantics. Friday opened fair, and all were moving well; but during the day a variety of incidents occurred—some favourable and some the reverse—and markets swayed up and down. Finally, Consols finished $\frac{1}{4}$ better for the account, Rails for the most part had gained, and Transatlantics were decidedly better. On Saturday, the improvement was reinforced. The old storm centres were regarded as looking milder, and markets in general raised their heads. Consols regained $\frac{1}{4}$, closing at $75\frac{3}{4}$ to $76\frac{1}{4}$—the same as they had opened. The Money Market was firm for a while, and rates hardened. But about midweek the stiffness began to relax, and the market closed easy. Business in the Gas Market was not a bit more active than it had been in the preceding week, and movements were of the slightest and most uninteresting. In fact, there were hardly any changes except those arising from *ex div.* adjustments, which were numerous. The probability is that this inactivity is largely owing to a scarcity of stock in the market. In Gas Light and Coke issues, the ordinary was very moderately dealt in at rather easier figures, transactions ranging from $101\frac{1}{2}$ to $102\frac{1}{4}$. In the secured issues, the maximum realized 76, the preference $96\frac{3}{4}$ and 98, and the debenture $73\frac{1}{4}$ to 75. South Metropolitan was very quiet, and changed hands at $110\frac{1}{2}$ to $111\frac{3}{4}$. The debenture fetched $74\frac{1}{2}$. In Commercials, the 4 per cent. alone was dealt in, and realized 106 and 107. Among the Suburban and Provincial group, Alliance and Dublin made $61\frac{3}{4}$ to 64, British $45\frac{3}{4}$, ditto debenture $90\frac{1}{4}$, Lea Bridge $120\frac{1}{2}$, and (on the local Exchange) Liverpool "A" $211\frac{1}{2}$. In the Continental companies, Imperial was done at 175 to $176\frac{3}{4}$, Union at 81, ditto preference at 120, and European at $18\frac{9}{16}$. Among the undertakings of the remoter world, Monte Video marked $11\frac{13}{16}$, Oriental 121 and $121\frac{1}{2}$, Primitiva $6\frac{3}{8}$ to $6\frac{7}{8}$, ditto preference 5 to $5\frac{3}{8}$, and ditto debenture 93.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, 5 per cent. Consols, $75\frac{3}{4}$—$76\frac{1}{4}$. Previous week, $75\frac{3}{4}$—$76\frac{1}{4}$.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 15	4	Alliance & Dublin Ord.	60—64	..	6 5 0	75,000	5	Dec. 11	6	Malta & Mediterranean	$4\frac{3}{8}$—$4\frac{5}{8}$	..	6 3 1
374,000	,,	Jan. 15	4	Do. 4 p.c. Deb.	73—81	..	4 12 9	250,000	100	Oct. 1	$4\frac{1}{2}$	Met. of Melbourne 4½ p.c. Deb.	98—100	..	4 10 0
280,000	5	Oct. 15	$7\frac{1}{2}$	Bombay, Ltd.	6—$6\frac{1}{2}$	..	5 15 5								
50,000	10	Feb. 26	16	Bourne-mouth Gas and Water { 10 p.c.	$27\frac{3}{4}$—$28\frac{3}{4}$*	..	5 11 4	541,920	20	Nov. 27	4	Monte Video, Ltd.	$11\frac{3}{4}$—$12\frac{1}{4}$	..	6 10 8
854,500	10	,,	7	B 7 p.c.	$14\frac{1}{2}$—15*	+$\frac{1}{4}$	4 13 4	1,775,892	Stk.	Feb. 26	$4\frac{1}{2}$	Newc'tle&G'tesh'd Con.	$99\frac{3}{4}$—$100\frac{1}{4}$*	..	4 9 7
75,000	10	,,	6	Pref. 6 p.c.	$13\frac{1}{4}$—$13\frac{3}{4}$*	+$\frac{1}{4}$	4 7 3	529,705	Stk.	Dec. 30	$3\frac{1}{2}$	Do. 3½ p.c. Deb.	82—83	..	4 4 4
880,000	Stk.	Feb. 26	14	Brentford Consolidated	256—261*	..	5 7 3	55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	$12\frac{1}{2}$—$13\frac{1}{2}$	..	5 14 1
330,000	,,	,,	11	Do. New	202—207*	+$\frac{1}{2}$	5 6 3	300 000	Stk.	Nov. 27	8	Oriental, Ltd.	120—125	..	6 8 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111*	+$\frac{1}{2}$	4 10 1	60,000	5	Sept. 26	10	Ottoman, Ltd.	$7\frac{7}{8}$—$8\frac{1}{4}$	..	6 3 1
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	98—95	..	4 4 3	60,000	50	Feb. 26	13	Portsea, Island B	127—130*	..	5 0 0
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	196—201*	+$\frac{1}{2}$	5 9 5	100,000	50	,,	12	Do. C	118—121*	+1	4 19 2
244,200	,,	,,	8	Do. A Ord. Stk.	145—148*	..	5 8 1	249,980	5	Oct. 15	8	Primitiva Ord.	$6\frac{1}{2}$—7	..	5 14 4
530,000	20	Sept. 26	$12\frac{1}{2}$	British	45—46	..	5 8 8	499,960	5	Dec. 30	5	,, 5 p.c. Pref.	5—$5\frac{1}{4}$	..	4 15 3
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	90—92	..	4 7 0	521,600	100	Dec. 1	4	,, 4 p.c. Deb.	93—95	..	4 4 3
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89—91	..	4 7 11	346,198	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	87—89	..	4 9 11
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—	275,000	5	Sept. 26	12	San Paulo, Ltd.	—	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	$2\frac{1}{2}$—$4\frac{1}{2}$	..	—	150,000	10	,,	6	Do. 6 p.c. Pref.	$10\frac{1}{4}$—$11\frac{3}{4}$	..	5 5 6
100,000	Stk.	Dec. 30	$4\frac{1}{2}$	Do. 4½ p.c. Deb. Stk.	73—78	..	5 15 5	125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	48—50	..	5 0 0
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	$106\frac{1}{2}$—$108\frac{1}{2}$*	..	4 12 2	135,000	Stk.	Aug. 28	10	Sheffield A	223—225	..	4 8 11
1,518,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	$105\frac{1}{2}$—$107\frac{1}{2}$	..	5 1 7	209,984	,,	,,	10	Do. B	223—225	..	4 8 11
560,000	,,	,,	$5\frac{1}{4}$	Do. 3½ p.c. do.	$103\frac{1}{2}$—$105\frac{1}{2}$	..	5 1 1	523,500	,,	,,	10	Do. C	222—224	..	4 9 3
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	71—73	..	4 2 2	90,000	10	Oct. 15	$7\frac{1}{2}$	South African	$10\frac{1}{4}$—$11\frac{1}{2}$	..	6 10 5
800,000	Stk.	,,	$4\frac{1}{2}$	Continental Union, Ltd.	79—82	..	5 9 9	6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	110—112	..	4 17 7
200,000	,,	,,	7	Do. 7 p.c. Pref.	117—122	..	5 14 9	1,895,445	,,	Jan. 15	3	Do. 3 p.c. Deb.	73—75	..	4 0 0
492,270	Stk.	—	$5\frac{3}{4}$	Derby Con. Stk.	123—125	..	4 12 0	209,820	Stk.	Feb. 26	$8\frac{1}{2}$	South Shields Con. Stk.	155—157*	+$\frac{1}{2}$	5 8 3
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11	952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116*	..	5 3 5
1,002,180	10	Jan. 15	10	European, Ltd.	$17\frac{1}{2}$—$18\frac{1}{2}$	..	5 8 1	60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112*	+$\frac{1}{2}$	4 9 3
16,386,660	Stk.	Feb. 12	1/17/4	Gas-light and Coke { 4 p.c. Ord.	101—103	−$\frac{1}{2}$	4 14 7	117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	113—115	..	4 6 11
2,600,000	,,	,,	$3\frac{1}{2}$	3½ p.c. max.	74—77	..	4 10 11	594,740	Stk.	Nov. 13	5	Southampton Ord.	101—104	..	4 16 2
4,062,235	,,	,,	4	4 p.c. Con. Pref.	95—98	..	4 1 8	120,000	Stk.	Feb. 12	$7\frac{3}{8}$	Tottenham District { A 5 p.c.	135—138	..	5 6 10
4,674,850	,,	Dec. 11	3	3 p.c. Con. Deb.	73—75	+$\frac{1}{2}$	4 0 0	543,940	,,	,,	$5\frac{5}{8}$	B 3½ p.c.	114—116	..	5 1 3
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—92	..	5 8 8	149,470	,,	Dec. 30	4	4 p.c. Deb.	89—91	..	4 7 11
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	$16\frac{3}{4}$—$17\frac{1}{4}$	..	6 7 6	182,380	10	,,	5	Tuscan, Ltd.	5—6	..	8 6 8
131,000	Stk.	Sept. 11	$7\frac{3}{8}$	Ilford A and C	150—153	..	4 19 8	149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—97	..	5 3 1
65,780	,,	,,	$6\frac{1}{2}$	Do. B	118—120	..	5 2 1	236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	111—113	..	4 8 6
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	89—91	..	4 7 11					Wandsworth, Wimbledon, and Epsom—			
4,940,000	Stk.	Nov. 13	9	Imperial Continental	174—179	..	5 0 7					Wandsworth A 5 p.c.	151—156*	..	5 7 4
1,285,000	Stk.	Feb. 12	$8\frac{1}{2}$	Do. 3½ p.c. Deb. Red.	$83\frac{1}{2}$—85	..	4 1 10	30,000	Stk.	Feb. 26	$8\frac{3}{8}$	,, B 3½ p.c.	129—134*	..	5 2 7
200,242	Stk.	Aug. 28	$6\frac{1}{2}$†	Lea Bridge Ord. 5 p.c.	118—121	..	5 7 5	255,636	,,	,,	$6\frac{1}{2}$	,, C 3½ p.c.	110—115*	..	5 2 0
561,000	Stk.	Feb. 26	10	Liverpool United A	206—208*	..	4 16 2	108,075	,,	,,	5/17/8	Wimbledon 5 p.c.	108—113*	..	5 8 3
718,100	,,	,,	7	Do. B	141½—143½*	..	4 17 7	352,000	,,	,,	$6\frac{1}{2}$	Epsom 5 p.c.	112—117*	..	5 13 3
906,088	,,	Dec. 30	4	Do. Deb. Stk.	98—100	..	4 0 0	98,000	,,	,,	$6\frac{3}{8}$	3 p.c. Deb. Stk.	71—73	..	4 2 2
63,480	Stk.	Dec. 30	3	Maidstone 3 p.c. Deb.	65—67	..	4 9 7	88,416	,,	Dec. 30	3				

Prices marked * are "Ex Div." † Next Dividend will be at this rate.